This document gives pertinent information concerning the reissuance of the VPDES Permit listed below. This permit is being processed as a Minor, Municipal permit. The discharge results from the operation of a 0.4 MGD wastewater treatment plant with a future flow tier of 0.8 MGD. This permit action consists of updating the WQS, updating boilerplate, incorporating a Water Effects Ratio Study for copper, and reviewing toxic limits. The effluent limitations and special conditions contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et seq.

1. Facility Name and Mailing Address: Louisa Regional WWTP, PO Box 9, Louisa, VA 23093 — SIC Code: 4952 WWTP

   Facility Location: 131 Pine Ridge Drive, 0.8 miles south of State Route 22 / U.S. Route 33 intersection — County: Louisa

   Facility Contact Name: David Jones — Telephone Number: (540) 967-0696

2. Permit No.: VA0067954 — Expiration Date of previous permit: 3/29/2009

   Other VPDES Permits associated with this facility: VAN030125

   Other Permits associated with this facility: None

   E2/E3/E4 Status: Not Applicable

3. Owner Name: Town of Louisa and County of Louisa

   Owner Contact/Title: Barlow Delk, General Manager — Telephone Number: (540) 967-1122

4. Application Complete Date: 10/2/08

   Permit Drafted By: Alison Thompson — Date Drafted: 7/30/09

   Draft Permit Reviewed By: Joan Crowther — Date Reviewed: 8/12/09

   Public Comment Period: Start Date: 10/15/09 — End Date: 11/14/09

5. Receiving Waters Information: See Attachment 1 for the Flow Frequency Determination

Receiving Stream Name:	Beaver Creek		
Drainage Area at Outfall:	0.57 sq.mi.	River Mile:	5.88
Stream Basin:	York	Subbasin:	York
Section:	3	Stream Class:	III
Special Standards:	none	Waterbody ID:	VAN-F02R
7Q10 Low Flow:	0.003 MGD	7Q10 High Flow (Nov-Mar):	0.056 MGD
1Q10 Low Flow:	0.003 MGD	1Q10 High Flow (Nov–Mar):	0.043 MGD
Harmonic Mean Flow:	0.060 MGD	30Q5 Flow:	0.014 MGD
303(d) Listed:	No	30Q10 Flow:	0.078 MGD
TMDL Approved:	Yes (for the Pamunkey)	Date TMDL Approved:	8/2/06

6. Statutory or Regulatory Basis for Special Conditions and Effluent Limitations:

   ✓ State Water Control Law
   ✓ Clean Water Act
   ✓ VPDES Permit Regulation
   ✓ EPA NPDES Regulation
   ✓ EPA Guidelines
   ✓ Water Quality Standards
   ___ Other

7. Licensed Operator Requirements: Class III for 0.4 MGD Class II for 0.8 MGD

8. Reliability Class: Class I (Assigned 12/7/1983)

9. Permit Characterization:

___ Private	✓ Effluent Limited	___ Possible Interstate Effect
___ Federal	✓ Water Quality Limited	___ Compliance Schedule Required
___ State	✓ Toxics Monitoring Program Required	___ Interim Limits in Permit
✓ POTW	✓ Pretreatment Program Required	___ Interim Limits in Other Document
✓ TMDL		

10. Wastewater Sources and Treatment Description:

The Louisa Regional Wastewater Treatment Plant (WWTP) is a 0.40-MGD facility. The County of Louisa and Town of Louisa jointly own the WWTP. Wastewater from the County and Town is pumped to the influent pump station; two variable speed pumps are used to pump the wastewater to the influent screens. The screened wastewater flows to three oxidation ditches (run in series: anoxic, aerobic, polishing). During rain events, the wastewater is directed to the final oxidation ditch and through the return of the solids, treated in the first two oxidation ditches. This "storm mode" prevents the loss of the biomass in the first two ditches. The wastewater is then directed to the two clarifiers, treated via ultraviolet disinfection, and discharged to Beaver Creek.

Plans are proceeding for the expansion and upgrade of this facility to a 0.80 MGD plant. This expansion was addressed during the 2008 modification.

See the application for a facility schematic/diagram.

TABLE 1 – Outfall Description

Outfall Number	Discharge Sources	Treatment	Design Flow	Outfall Latitude and Longitude
001	Domestic and Commercial	See Item 10 above.	0.4 MGD	**38° 00' 30"** N **77° 59' 38"** W
See Attachment 2 for a copy of the Mineral topographic map (DEQ map #171C).				

11. Sludge Treatment and Disposal Methods:

Solids from the wastewater treatment are aerated in the two aerobic digesters, thickened and run through a belt press. The old solids drying beds are used as a storage pad until the residuals are taken to a local farm for land application. The facility personnel do their own land application. The submitted sludge application indicates that disposal at the County's landfill is the back-up disposal method.

12. Discharges, Intakes, Monitoring Stations, Other Items in Vicinity of Discharge

TABLE 2	
VA0088421	Twin Oaks Community STP discharge to Polecat Creek
8-TYD000.02	One time monitoring station of Beaver Creek prior to the 1998 reissuance of VA0067954.
8-SAR068.57	Ambient Monitoring Station on South Anna River used for stream information for the 1998 reissuance (BPJ).

13. Material Storage:

TABLE 3 - Material Storage		
Materials Description	Volume Stored	Spill/Stormwater Prevention Measures
Polymer	Mixing tank for one day operation	Stored inside
Caustic Soda	2500 gal bulk storage tank	Stored under cover

Site Inspection:

14. Performed by DEQ inspection staff on March 11, 2009 with a follow up inspection on May 8, 2009. DEQ noted that the ultra-violet (UV) disinfection system not functioning properly due to a blinking intensity meter and that the auto sampler which was not collecting flow proportional composite samples. The facility also had several laboratory deficiencies for improper sample analysis techniques and QA/QC procedures for Ammonia as Nitrogen, Carbonaceous Oxygen Demand, and Total Suspended Solids. Copies of the inspection summaries have been placed in the reissuance file. The facility is currently negotiating a Consent Order with DEQ for the deficiencies.

15. Receiving Stream Water Quality and Water Quality Standards:

a) Ambient Water Quality Data

The segment of Beaver Creek in Louisa County containing Louisa Regional WWTP is not listed in the 2008 305(b)/303(d) Integrated Report. The Pamunkey River Basin Bacteria TMDL was approved by the United States Environmental Protection Agency (EPA) on August 2, 2006. The TMDL included a waste load allocation (WLA) for the Louisa Regional WWTP based off their maximum permitted design flow (0.4 MGD) at the time of TMDL completion. In the original TMDL, discharges from permitted point sources were increased by two and five times the existing permit levels to determine the effect of possible expansion by current facilities, or the issuance of new permits within the watershed. The increases did not result in additional exceedances of the water quality standard. Thus, the TMDL was modified to include the expanded discharge.

The 2008 305(b)/303(d) Integrated Report (IR) also includes the Virginia portions of the Chesapeake Bay and its tributaries in the List of Impaired (Category 5) Waters for not meeting the aquatic life use support goal. The IR indicates that 83% of the mainstem Bay does not support the aquatic life use support goal. Nutrient enrichment is cited as one of the primary causes of impairment.

In response, the Virginia General Assembly amended the State Water Control Law in 2005 to include the *Chesapeake Bay Watershed Nutrient Credit Exchange Program.* This statute set forth total nitrogen and total phosphorus discharge restrictions within the bay watershed. Concurrently, the State Water Control Board adopted new water quality criteria for the Chesapeake Bay and its tidal tributaries. These actions necessitate the evaluation and the inclusion of nitrogen and phosphorus limits on discharges within the bay watershed.

b) Receiving Stream Water Quality Criteria

Part IX of 9 VAC 25-260(360-550) designates classes and special standards applicable to defined Virginia river basins and sections. The receiving stream Beaver Creek is located within Section 3 of the York River Basin, and classified as a Class III water.

At all times, Class III waters must achieve a dissolved oxygen (D.O.) of 4.0 mg/L or greater, a daily average D.O. of 5.0 mg/L or greater, a temperature that does not exceed 32°C, and maintain a pH of 6.0-9.0 standard units (S.U.).

Attachment 3 details other water quality criteria applicable to the receiving stream.

Ammonia:

Since the instream waste concentration (IWC) during critical flows is greater that 99%, the stream quality will mirror the effluent quality; therefore, it is appropriate to use the effluent pH and temperature data for criteria development. Staff reviewed the 90th percentile pH and temperature values that were established in the 2004 reissuance to establish the criteria; the values are still appropriate and shall be carried forward for this reissuance. A copy of the data has been placed in the file.

Metals Criteria (except Copper):

The Water Quality Criteria for some metals are dependent on the receiving stream's hardness (expressed as mg/l calcium carbonate). As with ammonia, since the IWC is 99% during critical flows, the effluent data for hardness can be used to determine the metals criteria. The hardness-dependent metals criteria in Attachment 3 are based on an average effluent value of 83 mg/L; this average value was established during the permit modification in 2008. A copy of the data has been placed in the file.

Copper Criteria and the Water Effects Ratio Study:

During the last reissuance, DEQ determined that limits were necessary for copper. Monitoring and a Schedule of Compliance were included in the 2004 permit. As part of the 2008 modification, Louisa County Water Authority requested that the limits be reviewed based on the additional total hardness and copper data that were available for analysis.

LCWA pursued a Water Effects Ratio (WER) streamlined study for copper since the new data demonstrated that a limit was still necessary. The first two samples for the WER were submitted to DEQ on August 27, 2007. One of the samples was rejected due to a high total suspended solids concentration, so an additional sample was analyzed and the Final Streamlined WER Report was submitted to DEQ on March 24, 2008. As of the date of the 2008 modification, the WER Report had not been approved by DEQ-WQS or EPA, so the decision was made to move forward with the modification without reevaluating the copper limits.

DEQ-NRO received notice on July 21, 2009, that EPA had tentatively approved the WER Study as submitted. Fact Sheet Section 24 includes a full discussion of the EPA approval. The WER results will be included in the public notice of the permit.

Calculation of the Chronic Copper Criterion – hardness = 83 mg/L:

WER * [e{0.8545[ln(hardness)]-1.702}] * (CFc)
WER * 7.956 ug/L * 0.96
7.638 ug/L

For Total Recoverable Copper Chronic, using the total Copper WER of 15.70:

WERt * 7.956 Note: The CFc is not used.
15.70 * 7.956
124.9 ug/L (DEQ-WQS notes that the value is rounded to 120 ug/L)

Calculation of the Acute Copper Criterion – hardness = 83 mg/L:

WER * [e{0.9422[ln(hardness)]-1.700}] * (CFc)
WER * 11.74 ug/L * 0.96
11.28 ug/L

For Total Recoverable Copper Acute, using the total Copper WER of 15.70:

WERt * 11.74 Note: The CFc is not used.
184.3 ug/L (DEQ-WQS notes that the value is rounded to 180 ug/L)

Bacteria Criteria:

The Virginia Water Quality Standards (9 VAC 25-260-170 B.) states sewage discharges shall be disinfected to achieve the following criteria:

1) *E. coli* bacteria per 100 ml of water shall not exceed the following:

	Geometric Mean[1]	Single Sample Maximum
Freshwater *E. coli* (N/100 ml)	126	235

[1]For two or more samples [taken during any calendar month].

c) Receiving Stream Special Standards

The State Water Control Board's Water Quality Standards, River Basin Section Tables (9 VAC 25-260-360, 370 and 380) designates the river basins, sections, classes, and special standards for surface waters of the Commonwealth of Virginia. The receiving stream, Beaver Creek, is located within Section 3 of the York Basin. This section has not been designated with a special standard.

d) Threatened or Endangered Species

The Virginia DGIF Fish and Wildlife Information System Database was searched for records to determine if there are threatened or endangered species in the vicinity of the discharge. No threatened or endangered species were confirmed in the vicinity of the discharge in a search conducted on June 7, 2007. The limits proposed in this draft permit are protective of the Virginia Water Quality Standards and therefore, protect any potential threatened and endangered species found near the discharge. A copy of the search has been placed in the file.

16. Antidegradation (9 VAC 25-260-30):

All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The receiving stream has been classified as Tier 1 based on an evaluation of the critical stream flows. The drainage area above the discharge point is 0.57 sq.mi. and the 7Q10 is 0.003 MGD. At times, the discharge volume is much greater than the flow in the stream. It is staff's best professional opinion that the instream waste concentration is essentially 100% during critical stream flows, and the water quality of the stream will mirror the quality of the effluent. Permit limits proposed have been established by determining wasteload allocations which will result in attaining and/or maintaining all water quality criteria which apply to the receiving stream, including narrative criteria. These wasteload allocations will provide for the protection and maintenance of all existing uses.

17. Effluent Screening, Wasteload Allocation, and Effluent Limitation Development :

To determine water quality-based effluent limitations for a discharge, the suitability of data must first be determined. Data is suitable for analysis if one or more representative data points is equal to or above the quantification level ("QL") and the data represent the exact pollutant being evaluated.

Next, the appropriate Water Quality Standards are determined for the pollutants in the effluent. Then, the Wasteload Allocations (WLA) are calculated. The WLA values are then compared with available effluent data to determine the need for effluent limitations. Effluent limitations are needed if the 97th percentile of the daily effluent concentration values is greater than the acute wasteload allocation or if the 97th percentile of the four-day average effluent

concentration values is greater than the chronic wasteload allocation. Effluent limitations are the calculated on the most limiting WLA, the required sampling frequency, and statistical characteristics of the effluent data.

a) Effluent Screening:

Effluent data obtained from the permit application and the last year of DMRs were reviewed and determined to be suitable for evaluation. There have been exceedances of the established limitations for Zinc. It is believed that the high zinc concentrations are a result of the zinc orthophosphate fed as a corrosion inhibitor at the water plant. There have also been recent violations of the TKN limits and once instance of the effluent pH below the minimum limit of 6.0 s.u.

The following pollutants require a wasteload allocation analysis: Copper and Ammonia. The Zinc limit was re-evaluated during the 2008 modification. Staff does not believe that it needs another wasteload allocation analysis with this reissuance.

b) Mixing Zones and Wasteload Allocations (WLAs):

Wasteload allocations (WLAs) are calculated for those parameters in the effluent with the reasonable potential to cause an exceedance of water quality criteria. The basic calculation for establishing a WLA is the steady state complete mix equation:

$$WLA = \frac{C_o [Q_e + (f) (Q_s)] - [(C_s) (f) (Q_s)]}{Q_e}$$

Where:

- WLA = Wasteload allocation
- C_o = In-stream water quality criteria
- Q_e = Design flow
- f = Decimal fraction of critical flow from mixing evaluation
- Q_s = Critical receiving stream flow (1Q10 for acute aquatic life criteria; 7Q10 for chronic aquatic life criteria; 30Q10 for chronic ammonia; harmonic mean for carcinogen-human health criteria; and 30Q5 for non-carcinogen human health criteria)
- C_s = Mean background concentration of parameter in the receiving stream.

The Water Quality Standards contain two distinct mixing zone requirements. The first requirement is general in nature and requires the "use of mixing zone concepts in evaluating permit limits for acute and chronic standards in 9 VAC 25-260-140.B". The second requirement is specific and establishes special restrictions for regulatory mixing zones "established by the Board".

The Department of Environmental Quality uses a simplified mixing model to estimate the amount of mixing of a discharge with the receiving stream within specified acute and chronic exposure periods. The simplified model contains the following assumptions and approximations:

- The effluent enters the stream from the bank, either via a pipe, channel or ditch.
- The effluent velocity isn't significantly greater (no more than 1 - 2 ft/sec greater) than the stream velocity.
- The receiving stream is much wider than its depth (width at least ten times the depth).
- Diffusive mixing in the longitudinal direction (lengthwise) is insignificant compared with advective transport (flow).
- Complete vertical mixing occurs instantaneously at the discharge point. This is assumed since the stream depth is much smaller than the stream width.
- Lateral mixing (across the width) is a linear function of distance downstream.
- The effluent is neutrally buoyant (e.g. the effluent discharge temperature and salinity are not significantly different from the stream's ambient temperature and salinity).
- Complete mix is determined as the point downstream where the variation in concentration is 20% or less across the width and depth of the stream.
- The velocity of passing and drifting organisms is assumed equal to the stream velocity.

If it is suitably demonstrated that a reasonable potential for lethality or chronic impacts within the physical mixing area doesn't exist, then the basic complete mix equation, with 100% of the applicable stream flow, is appropriate. If the mixing analysis determines there is a potential for lethality or chronic impacts within the physical mixing area, then the proportion of stream flow that has mixed with the effluent over the allowed exposure time is used in the basic complete mix equation. As such, the wasteload allocation equation is modified to account for the decimal fraction of critical flow (f).

Staff derived wasteload allocations where parameters are reasonably expected to be present in an effluent (e.g., total residual chlorine where chlorine is used as a means of disinfection) and where effluent data indicate the pollutant is present in the discharge above quantifiable levels. With regard to the Outfall 001 discharge, ammonia as N is likely present since this is a WWTP treating sewage, and monitoring indicates Zinc and Copper are present in the discharge.

c) Effluent Limitations Toxic Pollutants, Outfall 001 –

9 VAC 25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Those parameters with WLAs that are near effluent concentrations are evaluated for limits.

The VPDES Permit Regulation at 9 VAC 25-31-230.D. requires that monthly and weekly average limitations be imposed for continuous discharges from POTWs and monthly average and daily maximum limitations be imposed for all other continuous non-POTW discharges.

1) Ammonia as N:

Staff evaluated the new effluent data and has concluded it is not significantly different than what was used to derive the existing ammonia limits (Attachment 4). Therefore, existing seasonal ammonia limitations are proposed to continue in the reissued permit. The ammonia limits at the 0.8 flow tier are higher than those at the existing tier due to a change in the ammonia criteria that occurred after the 0.4 tier limits were established.

2) Total Recoverable Zinc:

During the last reissuance, DEQ determined that limits were necessary for zinc. Monitoring and a Schedule of Compliance were included in the 2004 permit reissuance. As part of the 2008 modification, Louisa County Water Authority requested that the limits be reviewed based on the additional total hardness and zinc data that were available for analysis. An average hardness of 83 mg/L was used to calculate the new zinc criteria and WLAs. The zinc limit was revised to 100 mg/L as part of the 2008 modification. See Attachment 4 for the derivation of the zinc limits.

3) Total Recoverable Copper:

During the 2004 reissuance, DEQ determined that limits were necessary for copper. LCWA performed a WER Study which was preliminarily approved by EPA on July 21, 2009. The study determined that the site-specific Water Effects Ratio is 15.70. This value is used to calculate the acute and chronic copper criteria which are used to calculate the new WLAs. Staff used all effluent data that exceeded the current limit of 7.4 ug/L in the evaluation. The new analysis shows that no limit is necessary for Copper. See Attachment 4 for the statistical evaluation.

d) Effluent Limitations and Monitoring, Outfall 001 – Conventional and Non-Conventional Pollutants

No changes to dissolved oxygen (D.O.), carbonaceous biochemical oxygen demand-5 day ($CBOD_5$) at the 0.4 MGD tier, biochemical oxygen demand-5 day (BOD_5) at the 0.8 MGD tier, total suspended solids (TSS), and pH limitations are proposed.

BOD_5 limitations were based on a downstream inspection done by the Valley Regional Office from July 21, 1994 and staff guidance dated March 9, 1987, "Advisory Notification of Effluent Limits for Swamps and

Marsh Waters." This guidance from A. J. Anthony is applicable to waters such as the downstream conditions of Beaver Creek where the water is shallow, flow is intermittent, and the waters cannot be easily modeled. Staff's discussion from the previous permit is found in Attachment 7. Staff believes that these assumptions are also appropriate for the expanded flow tier.

The limit for Total Suspended Solids at the 0.4 MGD tier is based on the federal effluent guideline for Secondary Treatment. When the facility expands, the TSS limit shall be 20 mg/L. This limit is based on staff's best professional judgment and negotiations with the permittee.

pH limitations are set at the water quality criteria.

E. coli limitations are in accordance with the Water Quality Standards 9 VAC25-260-170.

e) Effluent Annual Average Limitations and Monitoring, Outfall 001 – Nutrients

VPDES Regulation 9 VAC 25-31-220(D) requires effluent limitations that are protective of both the numerical and narrative water quality standards for state waters, including the Chesapeake Bay.

As discussed in Section 15, significant portions of the Chesapeake Bay and its tributaries are listed as impaired with nutrient enrichment cited as one of the primary causes. Virginia has committed to protecting and restoring the Bay and its tributaries.

The State Water Control Board adopted new Water Quality Criteria for the Chesapeake Bay in March 2005. In addition to the Water Quality Standards, there are three new regulations that necessitate nutrient limitations:

- 9 VAC 25-40 - *Regulation for Nutrient Enriched Waters and Dischargers within the Chesapeake Bay Watershed* requires discharges with design flows of ≥0.04 mgd to treat for TN and TP to either BNR levels (TN = 8 mg/l; TP = 1.0 mg/l) or SOA levels (TN = 3.0 mg/l and TP = 0.3 mg/l).

- 9 VAC 25-720 – *Water Quality Management Plan Regulation* sets forth TN and TP maximum wasteload allocations for facilities with design flows of ≥0.5 mgd limiting the mass loading from these discharges.

- 9 VAC 25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia* was approved by the State Water Control Board on September 6, 2006 and became effective January 1, 2007. This regulation specifies and controls the nitrogen and phosphorus loadings from facilities and specifies facilities that must register under the general permit. Nutrient loadings for those facilities registered under the general permit as well as compliance schedules and other permit requirements, shall be authorized, monitored, limited, and otherwise regulated under the general permit and not this individual permit. The facility has received coverage under the General Permit with permit number VAN030125.

The annual loadings for the Nutrient General Permit for Total Nitrogen and Total Phosphorus for the Louisa Regional STP were determined using the existing conditions and the "permitted design capacity", which is defined in 62.1-44.19.

Existing conditions: TN = 18.7 mg/L x 0.4 MGD x 8.3438 x 365 days = 22,780 lb/yr
TP = 2.5 mg/L x 0.4 MGD x 8.3438 x 365 days = 3,045 lb/yr

Nutrient Monitoring at the 0.4 MGD tier will continue with this reissuance at a frequency of once per month.

Monitoring for Nitrates + Nitrites, Total Kjeldahl Nitrogen, Total Nitrogen, and Total Phosphorus are included in this permit for the 0.8 MGD flow tier. Annual average effluent limitations, as well as monthly and year to date calculations, for Total Nitrogen and Total Phosphorus are also included. The monitoring is needed to protect the Water Quality Standards of the Chesapeake Bay. Monitoring frequencies are set at the

frequencies set forth in 9 VAC 25-820. The Annual Average concentrations are in conformance with the nutrient guidance for Chesapeake Bay dischargers as well as the WQIF Grant Agreement.

f) Effluent Limitations and Monitoring Summary.

The effluent limitations are presented in the following table. Limits were established for Flow, $CBOD_5$, BOD_5, Total Suspended Solids, Ammonia as Nitrogen, pH, Dissolved Oxygen, Total Recoverable Zinc, Total Nitrogen at the 0.8 MGD tier, Total Phosphorus at the 0.8 MGD tier, and *E. coli*. Monitoring is included for TKN, Nitrate+Nitrite, and Chronic Toxicity.

The mass loading (kg/d) for monthly and weekly averages were calculated by multiplying the concentration values (mg/l), with the flow values (in MGD) and a conversion factor of 3.785.

The VPDES Permit Regulation at 9 VAC 25-31-30 and 40 CFR Part 133 require that the facility achieve at least 85% removal for BOD/CBOD and TSS (or 65% for equivalent to secondary). The limits in this permit are water-quality-based effluent limits and result in greater than 85% removal.

Sample Type and Frequency are in accordance with the recommendations in the VPDES Permit Manual.

18. Antibacksliding:

The Total Recoverable Zinc limits tier were revised as part of the 2008 permit modification based on the additional total hardness and effluent data. The backsliding proposed conformed to the anti-backsliding provisions of Section 402(o) of the Clean Water Act, 9 VAC 25-31-220.L., and 40 § CFR 122.44. The zinc limits are water quality based effluent limits. Also, the coefficient of variation used to derive the limits is better because there is new data. The revisions to the limits are allowed since the revisions comply with the water quality standards 402(o)(3) and they are consistent with antidegradation 303(d)(4)(B).

The Total Recoverable Copper limits were removed as part of this reissuance based on the updated total hardness and effluent data provided as part of the 2008 modification and based on the results of the Water Effects Ratio Study conducted by the facility. The backsliding proposed conformed to the anti-backsliding provisions of Section 402(o) of the Clean Water Act, 9 VAC 25-31-220.L., and 40 § CFR 122.44. The copper limits are water quality based effluent limits. The revisions to the limits are allowed since the revisions comply with the water quality standards 402(o)(3) and they are consistent with antidegradation 303(d)(4)(B).

19. Effluent Limitations/Monitoring Requirements:

Design flow is 0.40 MGD.

Effective Dates: During the period beginning with the permit's effective date and lasting until the CTO for the 0.8 MGD flow tier or the expiration date, whichever comes first.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH	3	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
$CBOD_5$	3,5	10 mg/L 15 kg/day	15 mg/L 23 kg/day	NA	NA	3D/W	8 HC
Total Suspended Solids (TSS)	1	30 mg/L 45 kg/day	45 mg/L 68 kg/day	NA	NA	3D/W	8 HC
Dissolved Oxygen	3	NA	NA	6.0 mg/L	NA	1/D	Grab
Total Kjeldahl Nitrogen (TKN)	3, 6	NL mg/L	NA	NA	NA	1/M	8 HC
Ammonia, as N (April-October)	3	2.2 mg/L	3.0 mg/L	NA	NA	3D/W	8 HC
Ammonia, as N (November-March)	3	4.8 mg/L	6.5 mg/L	NA	NA	3D/W	8 HC
E. coli (Geometric Mean)	3	126 n/100mls	NA	NA	NA	3D/W	Grab
Nitrate+Nitrite, as N	3, 6	NL mg/L	NA	NA	NA	1/M	8HC
Total Nitrogen [a.]	3, 6	NL mg/L	NA	NA	NA	1/M	Calculated
Total Nitrogen – Year to Date [b.]	3, 6	NL mg/L	NA	NA	NA	1/M	Calculated
Total Nitrogen - Calendar Year [b.]	3, 6	NL mg/L	NA	NA	NA	1/YR	Calculated
Total Phosphorus	3, 6	NL mg/L	NA	NA	NA	1/M	8HC
Total Phosphorus – Year to Date [b.]	3, 6	NL mg/L	NA	NA	NA	1/M	Calculated
Total Phosphorus - Calendar Year [b.]	3, 6	NL mg/L	NA	NA	NA	1/YR	Calculated
Zinc, Total Recoverable	3	100 ug/L	100 ug/L	NA	NA	1/M	Grab
Chronic Toxicity – *C. dubia* (TU_c)		NA	NA	NA	NL	1/YR	8 HC
Chronic Toxicity – *P. promelas* (TU_c)		NA	NA	NA	NL	1/YR	8 HC

The basis for the limitations codes are:

1. Federal Effluent Requirements
2. Best Professional Judgement
3. Water Quality Standards
4. DEQ Disinfection Guidance
5. Stream Model
6. 9 VAC 25-40 (Nutrient Regulation)

MGD = Million gallons per day.
NA = Not applicable.
NL = No limit; monitor and report.
S.U. = Standard units.
TIRE = Totalizing, indicating and recording equipment.

1/D = Once every day.
1/M = Once every month.
3D/W = Three days a week.
1/YR = Once every calendar year.

8HC = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the Monitored 8-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of eight (8) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum eight (8) grab samples obtained at hourly or smaller intervals may be collected

Where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by ≥10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

a. Total Nitrogen = Sum of TKN plus Nitrate+Nitrite

b. See Section 20.a. for the calculation of the Nutrient Calculations.

19. Effluent Limitations/Monitoring Requirements:

Design flow is 0.80 MGD.
Effective Dates: During the period beginning with the CTO for the 0.8 MGD flow tier and lasting until the expiration date.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH	3	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
$CBOD_5$	3,5	10 mg/L 30 kg/day	15 mg/L 45 kg/day	NA	NA	3D/W	8H-C
Total Suspended Solids (TSS)	2	20 mg/L 60 kg/day	30 mg/L 91 kg/day	NA	NA	3D/W	8H-C
Dissolved Oxygen	3	NA	NA	6.0 mg/L	NA	1/D	Grab
Total Kjeldahl Nitrogen (TKN)	3	NL mg/L	NA	NA	NA	1/2W	8H-C
Ammonia, as N (April-October)	3,5	5.1 mg/L	6.8 mg/L	NA	NA	3D/W	8H-C
Ammonia, as N (November-March)	3,5	8.5 mg/L	11.5 mg/L	NA	NA	3D/W	8H-C
E. coli (Geometric Mean)	3	126 n/100mls	NA	NA	NA	1/D	Grab
Nitrate+Nitrite, as N	3, 6	NL mg/L	NA	NA	NA	1/2W	8H-C
Total Nitrogen [a.]	3, 6	NL mg/L	NA	NA	NA	1/2W	Calculated
Total Nitrogen – Year to Date [b.]	3, 6	NL mg/L	NA	NA	NA	1/M	Calculated
Total Nitrogen - Calendar Year [b.]	3, 6	8.0 mg/L	NA	NA	NA	1/YR	Calculated
Total Phosphorus	3	NL mg/L	NA	NA	NA	1/2W	8H-C
Total Phosphorus – Year to Date [b.]	3, 6	NL mg/L	NA	NA	NA	1/M	Calculated
Total Phosphorus - Calendar Year [b.]	3, 6	1.0 mg/L	NA	NA	NA	1/YR	Calculated
Zinc, Total Recoverable	3	100 µg/L	100 µg/L	NA	NA	1/M	Grab
Chronic Toxicity – *C. dubia* (TU_c)		NA	NA	NA	NL	1/YR	8H-C
Chronic Toxicity – *P. promelas* (TU_c)		NA	NA	NA	NL	1/YR	8H-C

The basis for the limitations codes are:

1. Federal Effluent Requirements
2. Best Professional Judgment
3. Water Quality Standards
4. DEQ Disinfection Guidance
5. Stream Model
6. 9 VAC 25-40 (Nutrient Regulation)

MGD = Million gallons per day.
NA = Not applicable.
NL = No limit; monitor and report.
S.U. = Standard units.
TIRE = Totalizing, indicating and recording equipment.

1/D = Once every day.
1/M = Once every month.
1/2W = Once every two weeks, >7 days apart
3D/W = Three days a week.
1/YR = Once every calendar year.

8H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the Monitored 8-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of eight (8) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum eight (8) grab samples obtained at hourly or smaller intervals may be collected

Where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by ≥10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

a. Total Nitrogen = Sum of TKN plus Nitrate+Nitrite

b. See Section 20.a. for the calculation of the Nutrient Calculations.

20. Other Permit Requirements:

a) Part I.B. of the permit contains quantification levels and compliance reporting instructions.

9 VAC 25-31-190.L.4.c. requires an arithmetic mean for measurement averaging and 9 VAC 25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Specific analytical methodologies for toxics are listed in this permit section as well as quantification levels (QLs) necessary to demonstrate compliance with applicable permit limitations or for use in future evaluations to determine if the pollutant has reasonable potential to cause or contribute to a violation. Required averaging methodologies are also specified.

The calculations for the Nitrogen and Phosphorus parameters shall be in accordance with the calculations set forth in 9 VAC 25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia.* §62.1-44.19:13 of the Code of Virginia defines how annual nutrient loads are to be calculated; this is carried forward in 9 VAC 25-820-70. As annual concentrations (as opposed to loads) are limited in the individual permit, these reporting calculations are intended to reconcile the reporting calculations between the permit programs, as the permittee is collecting a single set of samples for the purpose of ascertaining compliance with two permits.

b) Permit Section Part I.C., details the requirements for Toxics Management Program.

The VPDES Permit Regulation at 9 VAC 25-31-210 requires monitoring and 9 VAC 25-31-220.I, requires limitations in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act. A TMP is imposed for municipal facilities with a design rate >1.0 MGD, with an approved pretreatment program or required to develop a pretreatment program, or those determined by the Board based on effluent variability, compliance history, IWC, and receiving stream characteristics.

Louisa Regional began TMP testing with the 2003 reissuance since the facility has a Categorical Industry that discharges to the WWTP. The facility passed the quarterly testing and the monitoring was reduced to annual. Staff proposes to continue annual monitoring with two species with this reissuance. The details for the test species, calculations, and the testing schedule are contained in this section of the permit.

c) Permit Section Part I.D., details the requirements of a Pretreatment Program.
The VPDES Permit Regulation at 9 VAC 25-31-210 requires monitoring and 9 VAC 25-31-220.D. requires all discharges to protect water quality. The VPDES Permit Regulation at 9 VAC 25-31-730. through 900., and 40 CFR Part 403 requires POTWs with a design flow of >5 MGD and receiving from Industrial Users (IUs) pollutants which pass through or interfere with the operation of the POTW or are otherwise subject to pretreatment standards to develop a pretreatment program.

Since the Louisa Regional WWTP is a POTW and receives flow from a categorical industry, Paul Decorative Products, the WWTP shall be required to develop a pretreatment program with this reissuance of the permit. Program requirements and reporting are found in this section of the permit.

d) Permit Section Part 1.E. details requirements of the Sewage Sludge Management Plan, Sludge Monitoring and Additional Reporting Requirements.

1. Regulations:

The VPDES Permit Regulation (VAC 25-31-10 et seq.), has incorporated technical standards for the use or disposal of sewage sludge, specifically land application and surface disposal, promulgated under 40 CFR Part 503.

The Permit Regulation (9 VAC 25-31-420) also establishes the standards for the use or disposal of sewage sludge. This part establishes standards that consist of general requirements, pollutant limits, management practices, and operational standards for the final use or disposal of sewage sludge generated during the

treatment of domestic sewage in the treatment works.

2. Evaluations:
Sludge Classification:

The Louisa Regional WWTP is considered as Class I sludge management facility. The permit regulation (9 VAC 25-31-500) defines a Class I sludge management facility as any POTW which is required to have an approved pretreatment program defined under Part VII of the VPDES Permit Regulation (9 VAC 25-31-730 to 900) and/or any treatment works treating domestic sewage sludge that has been classified as a Class I facility by the Board because of the potential for its sewage sludge use or disposal practice to adversely affect public health and the environment.

Sludge Pollutant Concentration:
The average pollutant concentrations from sewage sludge analyses provided as part of the Louisa Regional WWTP application for the permit reissuance are presented in Table 4. The analysis results are from samples collected during the period from 2006 through 2008.

Table 4 – Louisa Regional WWTP Results

Pollutant	Average Concentration (mg/kg dry weight)	Sample Type
Arsenic	<0.5	Composite
Cadmium	<1	Composite
Copper	114.3	Composite
Lead	7	Composite
Mercury	0.11	Composite
Molybdenum	0.7	Composite
Nickel	<12.5	Composite
Selenium	0.6	Composite
Zinc	133.5	Composite

All sewage sludge applied to the land must meet the ceiling concentration for pollutants, listed in Table 5. Sewage sludge applied to the land must also meet either pollutant concentration limits, cumulative pollutant loading rate limits, or annual pollutant loading rate limits, also listed in Table 5.

Cumulative pollutant loading limits or annual pollutant loading limits may be applied to sewage sludge exceeding pollutant concentration limits but meeting the ceiling concentrations, depending upon the levels of treatment achieved and the form (bulk or bag) of sludge applied. It should be noted that ceiling concentration limits are instantaneous values and pollutant concentration limits are monthly average values. Calculations of cumulative pollutant loading should be based on the monthly average values and the annual whole sludge application rate.

Table 5- SEWAGE SLUDGE POLLUTANT LIMITS

Pollutant	Ceiling Concentration Limits for All Sewage Sludge Applied to Land (mg/kg)*	Pollutant Concentration Limits for EQ and PC Sewage Sludge (mg/kg)*	Cumulative Pollutant Loading Rate Limits for CPLR Sewage Sludge (kg/hectare)	Annual Pollutant Rate Limits for APLR Sewage Sludge (kg/hectare/356 day period)**
Arsenic	75	41	41	2.0
Cadmium	85	39	39	1.9
Copper	4,300	1,500	1,500	75
Lead	840	300	300	15
Mercury	57	17	17	0.85
Molybdenum	75	---	---	---
Nickel	420	420	420	21
Selenium	100	100	100	5.0
Zinc	7,500	2,800	2,800	140
Applies to:	All sewage sludge that is land applied	Bulk sewage sludge and bagged sewage sludge	Bulk sewage sludge	Bagged sewage
From VPDES Permit Reg. Part VI	Table 1, 9 VAC 25-31-540	Table 3, 9 VAC 25-31-540	Table 2, 9 VAC 25-31-540	Table 4, 9 VAC 25-31-540

*Dry-weight basis
**Bagged sewage sludge is sold or given away in a bag or other container.

Comparing data from Table 4 with Table 5 shows that metal concentrations are significantly below the ceiling and PC concentration requirements.

3. Options for Meeting Land Application:

There are four equally safe options for meeting land application requirements. The options include the Exceptional Quality (EQ) option, the Pollutant Concentration (PC) option, the Cumulative Pollutant Loading Rate (CPLR) option, and the Annual Pollutant Loading Rate (APLR) option.

Pollutant Concentration (PC) is the type of sludge that may only be applied in bulk and is subject to general requirements and management practices; however, tracking of pollutant loadings to the land is not required. The sludge from the Louisa Regional STP is considered Pollutant Concentration (PC) sewage sludge for the following reasons:

a) The bulk sewage sludge from the Louisa Regional STP meets the PC limits in Table 1 of VPDES Permit Regulation Part VI, 9 VAC 25-31-540.

b) The VPDES Permit Regulation, Part VI, Subpart D, (9 VAC 25-31-690 through 720) establishes the requirements for pathogen reduction in sewage sludge. The Louisa Regional WWTP is considered to produce a Class B sludge in accordance with the regulation (9 VAC 25-31-710.B.2. - Class B -Alternative 2. Alternative 2 defines Class B sludge as "Sewage sludge that is used or disposed that has been treated in a process that is equivalent to a Process to Significantly Reduce Pathogens (PSRP), as described in (9 VAC 25-31-710.D.). The Louisa Regional WWTP treats sludge using an aerobic digestion process to reduce pathogens in accordance with the requirements of 9 VAC 25-31-710.D.1.

c) The VPDES Permit Regulation, Part VI, Subpart D, (9 VAC 25-31-690 through 720) also establishes the requirements for Vector Attraction Reduction in sewage sludge. Based on the information supplied with the VPDES Sludge Application, the Louisa Regional WWTP meets the requirements for Vector Attraction Reduction as defined by (9 VAC 25-31-720.B.4): the specific oxygen uptake rate for aerobically digested sludge, calculated according to the method in 9 VAC 25-31-490.B.6.

4) Parameters to be Monitored:

In order to assure the sludge quality, the following parameters require monitoring: Arsenic, Cadmium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, and Zinc.

In order to ensure that proper nutrient management and pH management practices are employed, the following parameters are required: pH, Total Kjeldahl Nitrogen, Ammonia Nitrogen, Nitrate Nitrogen, Total Phosphorus, Total Potassium, and Alkalinity (lime treated sludge should be analyzed for percent calcium carbonate equivalence). The nutrient and pH monitoring requirements apply only if the permittee land applies their own sludge. Since Louisa Regional WWTP land applies their own sludge, they are required to monitor all parameters.

Soil monitoring in conjunction with soil productivity information is critical, especially for frequent applications, to making sound sludge application decisions from both an environmental and an agronomic standpoint. Since Louisa Regional WWTP land applies their own sludge, they are required to perform soil monitoring.

5) Monitoring Frequency:

The monitoring frequency is based on the amount of sewage sludge applied in a given 365-day period. The permit application indicates that the total dry metric tons of sewage sludge generated at Louisa Regional WWTP are 72.9 dry metric tons per 365-day period. The monitoring frequency for facilities that produce up to 290 metric tons per 365-day period is once per year.

Louisa Regional WWTP is required to provide the results of all monitoring performed in accordance with Part I.A., and information on management practices and appropriate certifications no later than February 19th of each year (as required by the 503 regulations) to the Northern Regional Office of the Department of Environmental Quality. Each report must document the previous calendar year's activities.

6) Sampling:
Representative sampling is an important aspect of monitoring. Because the pollutant limits pertain to the quality of the final sewage sludge applied to the land, samples must be collected after the last treatment process prior to land application. Composite samples should be required for all samplings from this facility.

7) Sludge Management Plan (SMP):
The SMP is required to be part of the VPDES permit application. The VPDES Sewage Sludge Permit Application Form and its attachments will constitute the applicant's SMP. Any proposed sewage treatment works treating domestic sewage must submit a SMP with the appropriate VPDES permit application forms at least 180 days prior to the date proposed for commencing operations. The permittee shall conduct all sewage sludge use or disposal activities in accordance with the SMP approved with the issuance of this permit. Any proposed changes in the sewage sludge use or disposal practices or procedures followed by the permittee shall be documented and submitted for Virginia Department of Environmental Quality review and approval no less than 90 days prior to the effective date of the changes.

Upon approval, the SMP becomes an enforceable part of the permit. The permit may be modified or alternatively revoked and reissued to incorporate limitations/conditions necessitated by substantial changes in sewage sludge use or disposal practices.

Louisa Regional WWTP has submitted the VPDES Sewage Sludge Permit Application Form and its attachments as well as a Nutrient Management Plan. The application is on file at the Northern Regional Office of the Department of Environmental Quality.

8) Reporting Requirements:
The reporting requirements are for POTWs with a design flow rate equal to or greater than 1 MGD (majors),

POTWs that serve a population of 10,000 or greater, and Class I sludge management facilities. A permit special condition, which requires these generators to submit an annual report on February 19th of each year, is included. The Louisa Regional WWTP shall use the Discharge Monitoring Report (DMR) forms as part of the annual report. A sample form (SP1 and S01) with proper DMR parameter codes and its instructions are provided. In addition to the DMR forms, the generators who land apply sewage sludge are responsible for submitting the additional information required by 9 VAC 25-31-590, *i.e.*, appropriate certification statements, descriptions of how pathogen and vector attraction reduction requirements are met, descriptions of how the management practices (if applicable) are being met, and descriptions of how site restrictions (if applicable) are being met.

9)Records Keeping:
This special condition outlines record retention requirements for sludge meeting Class B pathogen reduction and vector attraction reduction alternative 1-10. Table 7 presents the record keeping requirements.

Table 7: Record Keeping for PC Sludge

1	Pollutant concentrations of each pollutant in Part I.A.3. of the permit;
2	Description of how the pathogen reduction requirement in Part I.A.3. of the permit are met;
3	Description of how the vector attraction requirements in Part I.A.3. of the permit are met;
4	Description of how the management practice specified in the approved Sludge Management Plan and/or the permit are met;
5	Description of how the site restriction specified in the Sludge Management Plan and/or the permit are met;
6	Certification statement in Part I.E.21.b.f. of the permit.

21. Other Special Conditions :

a) 95% Capacity Reopener. The VPDES Permit Regulation at 9 VAC 25-31-200.B.2. requires all POTWs and PVOTWs develop and submit a plan of action to DEQ when the monthly average influent flow to their sewage treatment plant reaches 95% or more of the design capacity authorized in the permit for each month of any three consecutive month period. This facility is a POTW.

b) Indirect Dischargers. Required by VPDES Permit Regulation, 9 VAC 25-31-280 B.9 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

c) O&M Manual Requirement. Required by Code of Virginia §62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790; VPDES Permit Regulation, 9 VAC 25-31-190.E. Within 90 days of the effective date of this permit, the permittee shall submit for approval an Operations and Maintenance (O&M) Manual or a statement confirming the accuracy and completeness of the current O&M Manual to the Department of Environmental Quality, Northern Regional Office (DEQ-NRO). Future changes to the facility must be addressed by the submittal of a revised O&M Manual within 90 days of the changes. Non-compliance with the O&M Manual shall be deemed a violation of the permit.

d) CTC, CTO Requirement. The Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790 requires that all treatment works treating wastewater obtain a Certificate to Construct prior to commencing construction and to obtain a Certificate to Operate prior to commencing operation of the treatment works.

e) Licensed Operator Requirement. The Code of Virginia at §54.1-2300 et seq. and the VPDES Permit Regulation at 9 VAC 25-31-200 D, and Rules and Regulations for Waterworks and Wastewater Works Operators (18 VAC 160-20-10 et seq.) requires licensure of operators. This facility requires a Class III operator at the 0.4 MGD tier and a Class II operator at the 0.8 MGD tier.

f) Reliability Class. The Sewage Collection and Treatment Regulation at 9 VAC 25-790 requires sewerage works achieve a certain level of reliability in order to protect water quality and public health consequences in the event of component or system failure. The facility is required to meet a reliability Class of I.

g) Water Quality Criteria Reopener. The VPDES Permit Regulation at 9 VAC 25-31-220 D. requires establishment of effluent limitations to ensure attainment/maintenance of receiving stream water quality

criteria. Should effluent monitoring indicate the need for any water quality-based limitations, this permit may be modified or alternatively revoked and reissued to incorporate appropriate limitations.

h) Sludge Reopener. The VPDES Permit Regulation at 9 VAC 25-31-200.C.4. requires all permits issued to treatment works treating domestic sewage (including sludge-only facilities) include a reopener clause allowing incorporation of any applicable standard for sewage sludge use or disposal promulgated under Section 405(d) of the CWA. The facility includes a sewage treatment works. This is located in Part E of the permit with the other sewage sludge requirements.

i) Sludge Use and Disposal. The VPDES Permit Regulation at 9 VAC 25-31-100.P., 220.B.2., and 420-720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on their sludge use and disposal practices and to meet specified standards for sludge use and disposal. The facility includes a treatment works treating domestic sewage. This is located in Part E of the permit with the other sewage sludge requirements.

j) E3/E4. 9 VAC 25-40-70 B authorizes DEQ to approve an alternate compliance method to the technology-based effluent concentration limitations as required by subsection A of this section. Such alternate compliance method shall be incorporated into the permit of an Exemplary Environmental Enterprise (E3) facility or an Extraordinary Environmental Enterprise (E4) facility to allow the suspension of applicable technology-based effluent concentration limitations during the period the E3 or E4 facility has a fully implemented environmental management system that includes operation of installed nutrient removal technologies at the treatment efficiency levels for which they were designed.

k) Nutrient Reopener. 9 VAC 25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. 9 VAC 25-31-390 A authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.

l) Nutrient Offsets. The Virginia General Assembly, in their 2005 session, enacted a new Article 4.02 (Chesapeake Bay Watershed Nutrient Credit Exchange Program) to the Code of Virginia to address nutrient loads to the Bay. Section 62.1-44.19:15 sets forth the requirements for new and expanded dischargers, which are captured by the requirements of the law, including the requirement that non-point load reductions acquired for the purpose of offsetting nutrient discharges be enforced through the individual VPDES permit.

Permit Section Part II. Part II of the permit contains standard conditions that appear in all VPDES Permits. In general, these standard conditions address the responsibilities of the permittee, reporting requirements, testing procedures and records retention.

23. Changes to the Permit from the Previously Issued Permit:

a) Special Conditions:
   1) A Nutrient Offset special condition was added to the permit.
   2) A CTC/CTO special condition was added to the permit.
   3) The licensed operator requirement for the 0.8 MGD flow tier was changed to Class II.

b) Monitoring and Effluent Limitations:
   1) The effluent limits for copper were removed based on the new hardness data and the results of the Water Effects Ratio Study.
   2) The TSS limitations at the 0.8 MGD tier were changed from 10/15 mg/L to 20/30 mg/L. These values are based on negotiations with the pemittee.

24. Variances/Alternate Limits or Conditions:

From: Atkinson.Cheryl@epamail.epa.gov [mailto:Atkinson.Cheryl@epamail.epa.gov]
Sent: Tuesday, July 21, 2009 2:26 PM
To: Barron,Alex
Subject: Re: Water Effect Ratio (WER) for a Virginia Permittee

County of Louisa Regional sewage treatment plant (STP) discharge, streamlined water effect ratio (WER) for copper, NPDES permit VA0067954:

The Louisa Regional STP WER study was conducted to develop a site-specific WER for the purpose of applying the copper water quality criteria, as defined in 9 VAC 25-260-140(B).

The study concluded that the final WER for copper at the specified location is 15.70, which would result in acute and chronic criteria for copper of 181.35ug/l and 120.9 ug/l respectively, for the Louisa Regional STP NPDES permit.

Based on our review of the WER study, we believe that the WER study could provide a sound scientific rational to support the copper criteria as applied to the Louisa Regional STP NPDES permit. This review of the WER study and the resulting criteria is subject to any new information that may arise through the public notice process. Please note that these comments are preliminary in nature and do not constitute a determination by EPA under Clean Water Act § 303(c).

25. Public Notice Information:

First Public Notice Date: 10/15/09 Second Public Notice Date: 10/22/09

Public Notice Information is required by 9 VAC 25-31-280 B. All pertinent information is on file and may be inspected, and copied by contacting the: DEQ Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193, Telephone No. (703) 583-3834, alison.thompson@deq.virginia.gov. See Attachment 5 for a copy of the public notice document.

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing if public response is significant. Requests for public hearings shall state the reason why a hearing is requested, the nature of the issues proposed to be raised in the public hearing and a brief explanation of how the requester's interests would be directly and adversely affected by the proposed permit action. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given.

26. 303 (d) Listed Stream Segments and Total Max. Daily Loads (TMDL):

The Pamunkey River Basin Bacteria TMDL was approved by the United States Environmental Protection Agency (EPA) on August 2, 2006. The TMDL included a waste load allocation (WLA) for the Louisa Regional Sewage Treatment Plant (STP) based off their maximum permitted design flow at the time of TMDL completion. In the original TMDL, discharges from permitted point sources were increased by two and five times the existing permit levels to determine the effect of possible expansion by current facilities, or the issuance of new permits within the watershed. The increases did not result in additional exceedances of the water quality standard. Thus, the TMDL was modified to include this expanded discharge.

TMDL Reopener: This special condition is to allow the permit to reopened if necessary to bring it in compliance with any applicable TMDL that may be developed and approved for the receiving stream.

27. Additional Comments:

Previous Board Action(s): The facility is currently in enforcement due to numerous exceedances of the established Total Recoverable Zinc concentration as well as operational problems associated with the UV system and the autosampler. A Consent Special Order has been drafted and will go before the State Water Control Board in September 2009.

Staff Comments: This permitting action was delayed due to the WER study. The public notice for the reissuance must also include the information about the WER study and the site-specific copper criteria for this discharge. DEQ received notice from EPA WQS on July 21, 2009.

Public Comment: DEQ received two comments during the public notice. There was one request for the Water Effect Ratio study results from Olver Laboratories; there were no formal comments about the content of the study or the results. The other comment was received from the permittee on the proposed TSS limits at the 0.8 MGD tier. DEQ proposed a 10 mg/L monthly average to match the TSS to the BOD concentration since the two are closely related in terms of treatment. The permittee requested the TSS limits be changed to the Secondary Treatment concentration of 30 mg/L. A compromise of 20 mg/L monthly average and 30 mg/L weekly average with corresponding loadings was reached.

EPA Checklist: The checklist can be found in Attachment 6.

July 30, 2009
MEMORANDUM

TO: VPDES Reissuance File VA0067954

FROM: Alison Thompson

SUBJECT: Flow Frequency Determination of VPDES Permit No. VA0067954
Louisa Regional WWTP

COPIES:

The Flow Frequency determination for Louisa Regional WWTP's outfall on Beaver Creek was last conducted in 1993. The determination was carried forward during the 1998 reissuance. Since that time, the data at the two continuous record gages has been updated and now includes the 30Q10 determination. There is no current data for the South Anna River at measurement site (#01671680). In 1993 the flow frequencies at the outfall location were determined using values at the South Anna River measurement site (#01671680) and adjusting them by proportional drainage areas. The South Anna River measurement site has a 113 sq. mi. drainage area. The reference gage on Contrary River near Mineral, VA (#01670300) has a 5.53 sq. mi. drainage area. It is staff's best professional opinion that the gage on the Contrary River would better approximate the flow frequencies at the outfall location, since the drainage area for Beaver Creek at the outfall location is 0.57 sq. mi. Based on these facts, the new flow frequency determination for Beaver Creek at the outfall location is presented below. These flow figures are used for determining WLAs.

Contrary Creek near Mineral, VA (#01670300)

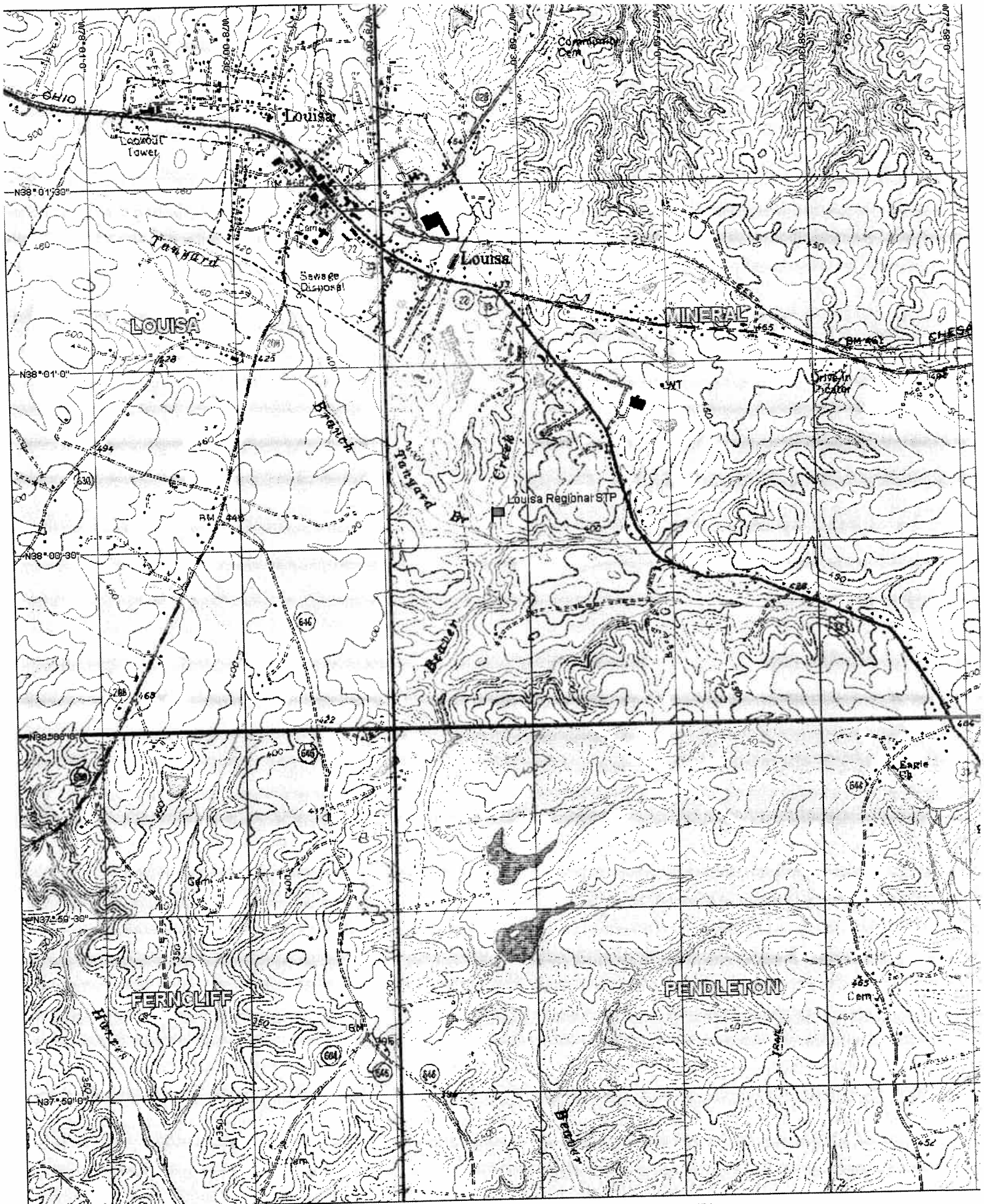
Drainage area	=	5.53 sq. mi.
1Q10	=	0.04 cfs
7Q10	=	0.05 cfs
30Q5	=	0.21 cfs
30Q10	=	0.12 cfs
High flow 1Q10	=	0.64 cfs
High flow 7Q10	=	0.83 cfs
HM	=	0.9 cfs

Beaver Creek at discharge point

Drainage area	=	0.57 sq. mi.
1Q10	=	0.004 cfs
7Q10	=	0.005 cfs
30Q5	=	0.022 cfs
30Q10	=	0.12 cfs
High flow 1Q10	=	0.066 cfs
High flow 7Q10	=	0.086 cfs
HM	=	0.093 cfs

The high flow months are November –March.

Attachment 1



3-D TopoQuads Copyright © 1999 DeLorme Yarmouth, ME 04096 Source Data: USGS 750 ft Scale: 1 : 25,000 Detail: 13-0 Datum: WGS84

Attachment 2

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Louisa Regional WWTP 0.4 MGD Permit No.: VA0067954

Receiving Stream: Beaver Creek Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	mg/L
90% Temperature (Annual) =	deg C
90% Temperature (Wet season) =	deg C
90% Maximum pH =	SU
10% Maximum pH =	SU
Tier Designation (1 or 2) =	1
Public Water Supply (PWS) Y/N? =	n
Trout Present Y/N? =	n
Early Life Stages Present Y/N? =	y

Stream Flows

1Q10 (Annual) =	0.003 MGD
7Q10 (Annual) =	0.003 MGD
30Q10 (Annual) =	0.078 MGD
1Q10 (Wet season) =	0.043 MGD
30Q10 (Wet season) =	MGD
30Q5 =	0.014 MGD
Harmonic Mean =	0.06 MGD
Annual Average =	MGD

Mixing Information

Annual - 1Q10 Mix =	100 %
- 7Q10 Mix =	100 %
- 30Q10 Mix =	100 %
Wet Season - 1Q10 Mix =	100 %
- 30Q10 Mix =	100 %

Effluent Information

Mean Hardness (as CaCO3) =	83 mg/l
90% Temp (Annual) =	25 deg C
90% Temp (Wet season) =	15 deg C
90% Maximum pH =	7.6 SU
10% Maximum pH =	7.6 SU
Discharge Flow =	0.4 MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--		na	2.7E+03	--	-	na	2.8E+03	--	--	--	--					--	--	na	2.8E+03
Acrolein	0			na	7.8E+02	--	--	na	8.1E+02	--	-	--	-					--	--	na	8.1E+02
Acrylonitrile [C]	0			na	6.6E+00	-		na	7.6E+00	--	--	--	--					--	--	na	7.6E+00
Aldrin [C]	0	3.0E+00	-	na	1.4E-03	3.0E+00		na	1.6E-03	--	-	--	--					3.0E+00	--	na	1.6E-03
Ammonia N (mg/l) (Yearly)	0	5.84E+01	4.69E+00	na	--	5.9E+01	5.6E+00	na	--	--	-	--	-					5.9E+01	5.6E+00	na	-
Ammonia N (mg/l) (High Flow)	0	5.84E+01	3.85E+00	na	-	6.5E+01	3.9E+00	na	-	--	--	--	--					6.5E+01	3.9E+00	na	--
Anthracene	0			na	1.1E+05	-		na	1.1E+05	--	--	-	-					--	--	na	1.1E+05
Antimony	0			na	4.3E+03		-	na	4.5E+03	-	-	-	-					--	--	na	4.5E+03
Arsenic	0	3.4E+02	1.5E+02	na		3.4E+02	1.5E+02	na		-	-	-	-					3.4E+02	1.5E+02	na	--
Barium	0			na		--	-	na	-	-	-	-	-					--	--	na	--
Benzene [C]	0		-	na	7.1E+02	--		na	8.2E+02	-	--	--	-					--		na	8.2E+02
Benzidine [C]	0			na	5.4E-03		-	na	6.2E-03	--	--	--						--	--	na	6.2E-03
Benzo (a) anthracene [C]	0			na	4.9E-01	--		na	5.6E-01	--	--	-	-					--	--	na	5.6E-01
Benzo (b) fluoranthene [C]	0			na	4.9E-01	--	--	na	5.6E-01	--	--	--						--	--	na	5.6E-01
Benzo (k) fluoranthene [C]	0			na	4.9E-01	--	-	na	5.6E-01	-	-	-						--	--	na	5.6E-01
Benzo (a) pyrene [C]	0			na	4.9E-01	--	-	na	5.6E-01	-	--	--						--	--	na	5.6E-01
Bis2-Chloroethyl Ether	0			na	1.4E+01	--	-	na	1.4E+01	-	-	-	-					--	--	na	1.4E+01
Bis2-Chloroisopropyl Ether	0			na	1.7E+05	--		na	1.8E+05	--	--	--	--					--	--	na	1.8E+05
Bromoform [C]	0			na	3.6E+03	--	--	na	4.1E+03	-	--	--	--					--	-	na	4.1E+03
Butylbenzylphthalate	0			na	5.2E+03	--	-	na	5.4E+03	-	--							--	--	na	5.4E+03
Cadmium	0	3.2E+00	9.7E-01	na		3.2E+00	9.8E-01	na		--	--	-	-					3.2E+00	9.8E-01	na	--
Carbon Tetrachloride [C]	0			na	4.4E+01	--	-	na	5.1E+01	--	--	-						--	--	na	5.1E+01
Chlordane [C]	0	2.4E+00	4.3E-03	na	2.2E-02	2.4E+00	4.3E-03	na	2.5E-02	--	-	--	--					2.4E+00	4.3E-03	na	2.5E-02
Chloride	0	8.6E+05	2.3E+05	na		8.7E+05	2.3E+05	na	-	--	--	--	--					8.7E+05	2.3E+05	na	--
TRC	0	1.9E+01	1.1E+01	na		1.9E+01	1.1E+01	na	--	--	--	--						1.9E+01	1.1E+01	na	--
Chlorobenzene	0			na	2.1E+04	-	--	na	2.2E+04	-	-	--	--					--	--	na	2.2E+04

Attachment 3

Parameter (ug/l unless noted)	Background Conc	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane [C]	0			na	3.4E+02			na	3.9E+02											na	3.9E+02
Chloroform [C]	0			na	2.9E+04			na	3.3E+04											na	3.3E+04
2-Chloronaphthalene	0			na	4.3E+03			na	4.5E+03											na	4.5E+03
2-Chlorophenol	0			na	4.0E+02			na	4.1E+02											na	4.1E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	na		8.4E-02	4.1E-02	na										8.4E-02	4.1E-02	na	
Chromium III	0	4.9E+02	6.3E+01	na		4.9E+02	6.4E+01	na										4.9E+02	6.4E+01	na	
Chromium VI	0	1.6E+01	1.1E+01	na		1.6E+01	1.1E+01	na										1.6E+01	1.1E+01	na	
Chromium, Total	0			na				na												na	
Chrysene [C]	0			na	4.9E-01			na	5.6E-01											na	5.6E-01
Copper	0	1.1E+01	7.6E+00	na		1.1E+01	7.6E+00	na										1.1E+01	7.6E+00	na	
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	2.2E+01	5.2E+00	na	2.2E+05									2.2E+01	5.2E+00	na	2.2E+05
DDD [C]	0			na	8.4E-03			na	9.7E-03											na	9.7E-03
DDE [C]	0			na	5.9E-03			na	6.8E-03											na	6.8E-03
DDT [C]	0	1.1E+00	1.0E-03	na	5.9E-03	1.1E+00	1.0E-03	na	6.8E-03									1.1E+00	1.0E-03	na	6.8E-03
Demeton	0		1.0E-01	na			1.0E-01	na											1.0E-01	na	
Dibenz(a,h)anthracene [C]	0			na	4.9E-01			na	5.6E-01											na	5.6E-01
Dibutyl phthalate	0			na	1.2E+04			na	1.2E+04											na	1.2E+04
Dichloromethane (Methylene Chloride) [C]	0			na	1.6E+04			na	1.8E+04											na	1.8E+04
1,2-Dichlorobenzene	0			na	1.7E+04			na	1.8E+04											na	1.8E+04
1,3-Dichlorobenzene	0			na	2.6E+03			na	2.7E+03											na	2.7E+03
1,4-Dichlorobenzene	0			na	2.6E+03			na	2.7E+03											na	2.7E+03
3,3-Dichlorobenzidine [C]	0			na	7.7E-01			na	8.9E-01											na	8.9E-01
Dichlorobromomethane [C]	0			na	4.6E+02			na	5.3E+02											na	5.3E+02
1,2-Dichloroethane [C]	0			na	9.9E+02			na	1.1E+03											na	1.1E+03
1,1-Dichloroethylene	0			na	1.7E+04			na	1.8E+04											na	1.8E+04
1,2-trans-dichloroethylene	0			na	1.4E+05			na	1.4E+05											na	1.4E+05
2,4-Dichlorophenol	0			na	7.9E+02			na	8.2E+02											na	8.2E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0			na				na												na	
1,2-Dichloropropane [C]	0			na	3.9E+02			na	4.5E+02											na	4.5E+02
1,3-Dichloropropene	0			na	1.7E+03			na	1.8E+03											na	1.8E+03
Dieldrin [C]	0	2.4E-01	5.6E-02	na	1.4E-03	2.4E-01	5.6E-02	na	1.6E-03									2.4E-01	5.6E-02	na	1.6E-03
Diethyl Phthalate	0			na	1.2E+05			na	1.2E+05											na	1.2E+05
Di(2-Ethylhexyl) Phthalate [C]	0			na	5.9E+01			na	6.8E+01											na	6.8E+01
2,4-Dimethylphenol	0			na	2.3E+03			na	2.4E+03											na	2.4E+03
Dimethyl Phthalate	0			na	2.9E+06			na	3.0E+06											na	3.0E+06
Di-n-Butyl Phthalate	0			na	1.2E+04			na	1.2E+04											na	1.2E+04
2,4-Dinitrophenol	0			na	1.4E+04			na	1.4E+04											na	1.4E+04
2-Methyl-4,6-Dinitrophenol	0			na	7.65E+02			na	7.9E+02											na	7.9E+02
2,4-Dinitrotoluene [C]	0			na	9.1E+01			na	1.0E+02											na	1.0E+02
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	0			na	1.2E-06			na	na											na	na
1,2-Diphenylhydrazine [C]	0			na	5.4E+00			na	6.2E+00											na	6.2E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E-01	5.6E-02	na	2.5E+02									2.2E-01	5.6E-02	na	2.5E+02
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E-01	5.6E-02	na	2.5E+02									2.2E-01	5.6E-02	na	2.5E+02
Endosulfan Sulfate	0			na	2.4E+02			na	2.5E+02											na	2.5E+02
Endrin	0	8.6E-02	3.6E-02	na	8.1E-01	8.7E-02	3.6E-02	na	8.4E-01									8.7E-02	3.6E-02	na	8.4E-01
Endrin Aldehyde	0			na	8.1E-01			na	8.4E-01											na	8.4E-01

Parameter (ug/l unless noted)	Background Conc	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0			na	2.9E+04			na	3.0E+04											na	3.0E+04
Fluoranthene	0			na	3.7E+02			na	3.8E+02											na	3.8E+02
Fluorene	0			na	1.4E+04			na	1.4E+04											na	1.4E+04
Foaming Agents	0			na				na												na	
Guthion	0		1.0E-02	na			1.0E-02	na											1.0E-02	na	
Heptachlor[C]	0	5.2E-01	3.8E-03	na	2.1E-03	5.2E-01	3.8E-03	na	2.4E-03									5.2E-01	3.8E-03	na	2.4E-03
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	1.1E-03	5.2E-01	3.8E-03	na	1.3E-03									5.2E-01	3.8E-03	na	1.3E-03
Hexachlorobenzene[C]	0			na	7.7E-03			na	8.9E-03											na	8.9E-03
Hexachlorobutadiene[C]	0			na	5.0E+02			na	5.8E+02											na	5.8E+02
Hexachlorocyclohexane Alpha-BHC[C]	0			na	1.3E-01			na	1.5E-01											na	1.5E-01
Hexachlorocyclohexane Beta-BHC[C]	0			na	4.6E-01			na	5.3E-01											na	5.3E-01
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	6.3E-01	9.6E-01		na	7.2E-01									9.6E-01		na	7.2E-01
Hexachlorocyclopentadiene	0			na	1.7E+04			na	1.8E+04											na	1.8E+04
Hexachloroethane[C]	0			na	8.9E+01			na	1.0E+02											na	1.0E+02
Hydrogen Sulfide	0		2.0E+00	na			2.0E+00	na											2.0E+00	na	
Indeno (1,2,3-cd) pyrene[C]	0			na	4.9E-01			na	5.6E-01											na	5.6E-01
Iron	0			na				na												na	
Isophorone[C]	0			na	2.6E+04			na	3.0E+04											na	3.0E+04
Kepone	0		0.0E+00	na			0.0E+00	na											0.0E+00	na	
Lead	0	9.3E+01	1.1E+01	na		9.4E+01	1.1E+01	na										9.4E+01	1.1E+01	na	
Malathion	0		1.0E-01	na			1.0E-01	na											1.0E-01	na	
Manganese	0			na				na												na	
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	1.4E+00	7.8E-01	na	5.3E-02									1.4E+00	7.8E-01	na	5.3E-02
Methyl Bromide	0			na	4.0E+03			na	4.1E+03											na	4.1E+03
Methoxychlor	0		3.0E-02	na			3.0E-02	na											3.0E-02	na	
Mirex	0		0.0E+00	na			0.0E+00	na											0.0E+00	na	
Monochlorobenzene	0			na	2.1E+04			na	2.2E+04											na	2.2E+04
Nickel	0	1.5E+02	1.7E+01	na	4.6E+03	1.6E+02	1.7E+01	na	4.8E+03									1.6E+02	1.7E+01	na	4.8E+03
Nitrate (as N)	0			na				na												na	
Nitrobenzene	0			na	1.9E+03			na	2.0E+03											na	2.0E+03
N-Nitrosodimethylamine[C]	0			na	8.1E+01			na	9.3E+01											na	9.3E+01
N-Nitrosodiphenylamine[C]	0			na	1.6E+02			na	1.8E+02											na	1.8E+02
N-Nitrosodi-n-propylamine[C]	0			na	1.4E+01			na	1.6E+01											na	1.6E+01
Parathion	0	6.5E-02	1.3E-02	na		6.5E-02	1.3E-02	na										6.5E-02	1.3E-02	na	
PCB-1016	0		1.4E-02	na			1.4E-02	na											1.4E-02	na	
PCB-1221	0		1.4E-02	na			1.4E-02	na											1.4E-02	na	
PCB-1232	0		1.4E-02	na			1.4E-02	na											1.4E-02	na	
PCB-1242	0		1.4E-02	na			1.4E-02	na											1.4E-02	na	
PCB-1248	0		1.4E-02	na			1.4E-02	na											1.4E-02	na	
PCB-1254	0		1.4E-02	na			1.4E-02	na											1.4E-02	na	
PCB-1260	0		1.4E-02	na			1.4E-02	na											1.4E-02	na	
PCB Total[C]	0			na	1.7E-03			na	2.0E-03											na	2.0E-03

Parameter (ug/l unless noted)	Background Conc	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Pentachlorophenol [C]	0	6.5E-02	5.0E-02	na	8.2E+01	6.6E-02	5.0E-02	na	9.4E+01	--	--	--	--	--	--	--	--	**6.6E-02**	**5.0E-02**	na	**9.4E+01**
Phenol	0	--	--	na	4.6E+06	--	--	na	4.8E+06	--	--	--	--	--	--	--	--	--	--	na	**4.8E+06**
Pyrene	0	--	--	na	1.1E+04	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	--	--	na	**1.1E+04**
Radionuclides (pCi/l except Beta/Photon)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity	0	--	--	na	1.5E+01	--	--	na	1.6E+01	--	--	--	--	--	--	--	--	--	--	na	**1.6E+01**
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	4.1E+00	--	--	--	--	--	--	--	--	--	--	na	**4.1E+00**
Strontium 90	0	--	--	na	8.0E+00	--	--	na	8.3E+00	--	--	--	--	--	--	--	--	--	--	na	**8.3E+00**
Tritium	0	--	--	na	2.0E+04	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	--	--	na	**2.1E+04**
Selenium	0	2.0E+01	5.0E+00	na	1.1E+04	2.0E+01	5.0E+00	na	1.1E+04	--	--	--	--	--	--	--	--	**2.0E+01**	**5.0E+00**	na	**1.1E+04**
Silver	0	2.5E+00	--	na	--	2.5E+00	--	na	--	--	--	--	--	--	--	--	--	**2.5E+00**	--	na	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,1,2,2-Tetrachloroethane [C]	0	--	--	na	1.1E+02	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	--	--	na	**1.3E+02**
Tetrachloroethylene [C]	0	--	--	na	8.9E+01	--	--	na	1.0E+02	--	--	--	--	--	--	--	--	--	--	na	**1.0E+02**
Thallium	0	--	--	na	6.3E+00	--	--	na	6.5E+00	--	--	--	--	--	--	--	--	--	--	na	**6.5E+00**
Toluene	0	--	--	na	2.0E+05	--	--	na	2.1E+05	--	--	--	--	--	--	--	--	--	--	na	**2.1E+05**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Toxaphene [C]	0	7.3E-01	2.0E-04	na	7.5E-03	7.4E-01	2.0E-04	na	8.6E-03	--	--	--	--	--	--	--	--	**7.4E-01**	**2.0E-04**	na	**8.6E-03**
Tributyltin	0	4.6E-01	6.3E-02	na	--	4.6E-01	6.3E-02	na	--	--	--	--	--	--	--	--	--	**4.6E-01**	**6.3E-02**	na	--
1,2,4-Trichlorobenzene	0	--	--	na	9.4E+02	--	--	na	9.7E+02	--	--	--	--	--	--	--	--	--	--	na	**9.7E+02**
1,1,2-Trichloroethane [C]	0	--	--	na	4.2E+02	--	--	na	4.8E+02	--	--	--	--	--	--	--	--	--	--	na	**4.8E+02**
Trichloroethylene [C]	0	--	--	na	8.1E+02	--	--	na	9.3E+02	--	--	--	--	--	--	--	--	--	--	na	**9.3E+02**
2,4,6-Trichlorophenol [C]	0	--	--	na	6.5E+01	--	--	na	7.5E+01	--	--	--	--	--	--	--	--	--	--	na	**7.5E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Vinyl Chloride [C]	0	--	--	na	6.1E+01	--	--	na	7.0E+01	--	--	--	--	--	--	--	--	--	--	na	**7.0E+01**
Zinc	0	9.9E+01	1.0E+02	na	6.9E+04	1.0E+02	1.0E+02	na	7.1E+04	--	--	--	--	--	--	--	--	**1.0E+02**	**1.0E+02**	na	**7.1E+04**

Notes

1. All concentrations expressed as micrograms/liter (ug/l) unless noted otherwise
2. Discharge flow is highest monthly average or 1 orm 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information
   Antidegradation WLAs are based upon a complete mix
6. Antideg. Baseline: (0.25(WQC - background conc.) + background conc.) for acute and chronic
   (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Mixing ratios may be substituted for stream flows where appropriate

Metal	Target Value (SSTV)
Antimony	4.5E+03
Arsenic	9.1E+01
Barium	na
Cadmium	5.9E-01
Chromium III	3.8E+01
Chromium VI	6.4E+00
Copper	4.5E+00
Iron	na
Lead	6.4E+00
Manganese	na
Mercury	5.3E-02
Nickel	1.0E+01
Selenium	3.0E+00
Silver	1.0E+00
Zinc	4.0E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Louisa Regional WWTP 0.8 MGD Permit No.: VA0067954 Version: OWP Guidance Memo 00-2011 (8/24/00)

Receiving Stream: Beaver Creek

Stream Information

Mean Hardness (as CaCO3) =	mg/L
90% Temperature (Annual) =	deg C
90% Temperature (Wet season) =	deg C
90% Maximum pH =	SU
10% Maximum pH =	SU
Tier Designation (1 or 2) =	1
Public Water Supply (PWS) Y/N? =	n
Trout Present Y/N? =	n
Early Life Stages Present Y/N? =	y

Stream Flows

1Q10 (Annual) =	0.003 MGD
7Q10 (Annual) =	0.003 MGD
30Q10 (Annual) =	0.08 MGD
1Q10 (Wet season) =	0.042 MGD
30Q10 (Wet season)	0.08 MGD
30Q5 =	0.014 MGD
Harmonic Mean =	0.06 MGD
Annual Average =	n/a MGD

Mixing Information

Annual - 1Q10 Mix =	100 %
- 7Q10 Mix =	100 %
- 30Q10 Mix =	100 %
Wet Season - 1Q10 Mix =	100 %
- 30Q10 Mix =	100 %

Effluent Information

Mean Hardness (as CaCO3) =	83 mg/l
90% Temp (Annual) =	25 deg C
90% Temp (Wet season) =	15 deg C
90% Maximum pH =	7.6 SU
10% Maximum pH =	SU
Discharge Flow =	0.8 MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0			na	2.7E+03			na	2.7E+03											na	2.7E+03
Acrolein	0			na	7.8E+02			na	7.9E+02											na	7.9E+02
Acrylonitrile [C]	0			na	6.6E+00			na	7.1E+00											na	7.1E+00
Aldrin [C]	0	3.0E+00		na	1.4E-03	3.0E+00		na	1.5E-03									3.0E+00		na	1.5E-03
Ammonia N (mg/l) (Yearly)	0	5.84E+01	4.18E+00	na		5.9E+01	4.6E+00	na										5.9E+01	4.6E+00	na	
Ammonia N (mg/l) (High Flow)	0	5.84E+01	7.09E+00	na		6.1E+01	7.8E+00	na										6.1E+01	7.8E+00	na	
Anthracene	0			na	1.1E+05			na	1.1E+05											na	1.1E+05
Antimony	0			na	4.3E+03			na	4.4E+03											na	4.4E+03
Arsenic	0	3.4E+02	1.5E+02	na		3.4E+02	1.5E+02	na										3.4E+02	1.5E+02	na	
Barium	0			na				na												na	
Benzene [C]	0			na	7.1E+02			na	7.6E+02											na	7.6E+02
Benzidine [C]	0			na	5.4E-03			na	5.8E-03											na	5.8E-03
Benzo (a) anthracene [C]	0			na	4.9E-01			na	5.3E-01											na	5.3E-01
Benzo (b) fluoranthene [C]	0			na	4.9E-01			na	5.3E-01											na	5.3E-01
Benzo (k) fluoranthene [C]	0			na	4.9E-01			na	5.3E-01											na	5.3E-01
Benzo (a) pyrene [C]	0			na	4.9E-01			na	5.3E-01											na	5.3E-01
Bis2-Chloroethyl Ether	0			na	1.4E+01			na	1.4E+01											na	1.4E+01
Bis2-Chloroisopropyl Ether	0			na	1.7E+05			na	1.7E+05											na	1.7E+05
Bromoform [C]	0			na	3.6E+03			na	3.9E+03											na	3.9E+03
Butylbenzylphthalate	0			na	5.2E+03			na	5.3E+03											na	5.3E+03
Cadmium	0	3.2E+00	9.8E-01	na		3.2E+00	9.8E-01	na										3.2E+00	9.8E-01	na	
Carbon Tetrachloride [C]	0			na	4.4E+01			na	4.7E+01											na	4.7E+01
Chlordane [C]	0	2.4E+00	4.3E-03	na	2.2E-02	2.4E+00	4.3E-03	na	2.4E-02									2.4E+00	4.3E-03	na	2.4E-02
Chloride	0	8.6E+05	2.3E+05	na		8.6E+05	2.3E+05	na										8.6E+05	2.3E+05	na	
TRC	0	1.9E+01	1.1E+01	na		1.9E+01	1.1E+01	na										1.9E+01	1.1E+01	na	
Chlorobenzene	0			na	2.1E+04			na	2.1E+04											na	2.1E+04

Parameter (ug/l unless noted)	Background Conc	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane[C]	0			na	3.4E+02			na	3.7E+02											na	3.7E+02
Chloroform [C]	0			na	2.9E+04			na	3.1E+04											na	3.1E+04
2-Chloronaphthalene	0			na	4.3E+03			na	4.4E+03											na	4.4E+03
2 Chlorophenol	0			na	4.0E+02			na	4.1E+02											na	4.1E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	na		8.3E-02	4.1E-02	na										8.3E-02	4.1E-02	na	
Chromium III	0	4.9E+02	6.3E+01	na		4.9E+02	6.4E+01	na										4.9E+02	6.4E+01	na	
Chromium VI	0	1.6E+01	1.1E+01	na		1.6E+01	1.1E+01	na										1.6E+01	1.1E+01	na	
Chromium Total	0			na				na												na	
Chrysene [C]	0			na	4.9E-01			na	5.3E-01											na	5.3E-01
Copper	0	1.1E+01	7.6E+00	na		1.1E+01	7.6E+00	na										1.1E+01	7.6E+00	na	
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	2.2E+01	5.2E+00	na	2.2E+05									2.2E+01	5.2E+00	na	2.2E+05
DDD [C]	0			na	8.4E-03			na	9.0E-03											na	9.0E-03
DDE [C]	0			na	5.9E-03			na	6.3E-03											na	6.3E-03
DDT [C]	0	1.1E+00	1.0E-03	na	5.9E-03	1.1E+00	1.0E-03	na	6.3E-03									1.1E+00	1.0E-03	na	6.3E-03
Demeton	0		1.0E-01	na			1.0E-01	na											1.0E-01	na	
Dibenz(a,h)anthracene [C]	0			na	4.9E-01			na	5.3E-01											na	5.3E-01
Dibutyl phthalate	0			na	1.2E+04			na	1.2E+04											na	1.2E+04
Dichloromethane (Methylene Chloride) [C]	0			na	1.6E+04			na	1.7E+04											na	1.7E+04
1,2 Dichlorobenzene	0			na	1.7E+04			na	1.7E+04											na	1.7E+04
1,3-Dichlorobenzene	0			na	2.6E+03			na	2.6E+03											na	2.6E+03
1,4-Dichlorobenzene	0			na	2.6E+03			na	2.6E+03											na	2.6E+03
3,3-Dichlorobenzidine [C]	0			na	7.7E-01			na	8.3E-01											na	8.3E-01
Dichlorobromomethane [C]	0			na	4.6E+02			na	4.9E+02											na	4.9E+02
1,2-Dichloroethane [C]	0			na	9.9E+02			na	1.1E+03											na	1.1E+03
1,1-Dichloroethylene	0			na	1.7E+04			na	1.7E+04											na	1.7E+04
1,2-trans-dichloroethylene	0			na	1.4E+05			na	1.4E+05											na	1.4E+05
2,4-Dichlorophenol	0			na	7.9E+02			na	8.0E+02											na	8.0E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0			na				na												na	
1,2-Dichloropropane [C]	0			na	3.9E+02			na	4.2E+02											na	4.2E+02
1,3-Dichloropropene	0			na	1.7E+03			na	1.7E+03											na	1.7E+03
Dieldrin [C]	0	2.4E-01	5.6E-02	na	1.4E-03	2.4E-01	5.6E-02	na	1.5E-03									2.4E-01	5.6E-02	na	1.5E-03
Diethyl Phthalate	0			na	1.2E+05			na	1.2E+05											na	1.2E+05
Di 2-Ethylhexyl Phthalate [C]	0			na	5.9E+01			na	6.3E+01											na	6.3E+01
2,4-Dimethylphenol	0			na	2.3E+03			na	2.3E+03											na	2.3E+03
Dimethyl Phthalate	0			na	2.9E+06			na	3.0E+06											na	3.0E+06
Di n Butyl Phthalate	0			na	1.2E+04			na	1.2E+04											na	1.2E+04
2,4-Dinitrophenol	0			na	1.4E+04			na	1.4E+04											na	1.4E+04
2-Methyl 4,6-Dinitrophenol	0			na	7.65E+02			na	7.8E+02											na	7.8E+02
2,4-Dinitrotoluene [C]	0			na	9.1E+01			na	9.8E+01											na	9.8E+01
Dioxin (2,3,7,8 tetrachlorodibenzo p dioxin) (ppq)	0			na	1.2E-06			na	na											na	na
1,2-Diphenylhydrazine [C]	0			na	5.4E+00			na	5.8E+00											na	5.8E+00
Alpha Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E-01	5.6E-02	na	2.4E+02									2.2E-01	5.6E-02	na	2.4E+02
Beta Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E-01	5.6E-02	na	2.4E+02									2.2E-01	5.6E-02	na	2.4E+02
Endosulfan Sulfate	0			na	2.4E+02			na	2.4E+02											na	2.4E+02
Endrin	0	8.6E-02	3.6E-02	na	8.1E-01	8.6E-02	3.6E-02	na	8.2E-01									8.6E-02	3.6E-02	na	8.2E-01
Endrin Aldehyde	0			na	8.1E-01			na	8.2E-01											na	8.2E-01

Parameter (ug/l unless noted)	Background Conc	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0			na	2.9E+04			na	3.0E+04											na	3.0E+04
Fluoranthene	0			na	3.7E+02			na	3.8E+02											na	3.8E+02
Fluorene	0			na	1.4E+04			na	1.4E+04											na	1.4E+04
Foaming Agents	0			na				na												na	--
Guthion	0		1.0E-02	na			1.0E-02	na											1.0E-02	na	--
Heptachlor [C]	0	5.2E-01	3.8E-03	na	2.1E-03	5.2E-01	3.8E-03	na	2.3E-03									5.2E-01	3.8E-03	na	2.3E-03
Heptachlor Epoxide [C]	0	5.2E-01	3.8E-03	na	1.1E-03	5.2E-01	3.8E-03	na	1.2E-03									5.2E-01	3.8E-03	na	1.2E-03
Hexachlorobenzene [C]	0			na	7.7E-03			na	8.3E-03											na	8.3E-03
Hexachlorobutadiene [C]	0			na	5.0E+02			na	5.4E+02											na	5.4E+02
Hexachlorocyclohexane Alpha-BHC [C]	0			na	1.3E-01			na	1.4E-01											na	1.4E-01
Hexachlorocyclohexane Beta-BHC [C]	0			na	4.6E-01			na	4.9E-01											na	4.9E-01
Hexachlorocyclohexane Gamma BHC [C] (Lindane)	0	9.5E-01	na	na	6.3E-01	9.5E-01		na	6.8E-01									9.5E-01		na	6.8E-01
Hexachlorocyclopentadiene	0			na	1.7E+04			na	1.7E+04											na	1.7E+04
Hexachloroethane [C]	0			na	8.9E+01			na	9.6E+01											na	9.6E+01
Hydrogen Sulfide	0		2.0E+00	na			2.0E+00	na											2.0E+00	na	--
Indeno (1,2,3-cd) pyrene [C]	0			na	4.9E-01			na	5.3E-01											na	5.3E-01
Iron	0			na				na												na	--
Isophorone [C]	0			na	2.6E+04			na	2.8E+04											na	2.8E+04
Kepone	0		0.0E+00	na			0.0E+00	na											0.0E+00	na	--
Lead	0	9.3E+01	1.1E+01	na		9.4E+01	1.1E+01	na										9.4E+01	1.1E+01	na	--
Malathion	0		1.0E-01	na			1.0E-01	na											1.0E-01	na	--
Manganese	0			na				na												na	--
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	1.4E+00	7.7E-01	na	5.2E-02									1.4E+00	7.7E-01	na	5.2E-02
Methyl Bromide	0			na	4.0E+03			na	4.1E+03											na	4.1E+03
Methoxychlor	0		3.0E-02	na			3.0E-02	na											3.0E-02	na	--
Mirex	0		0.0E+00	na			0.0E+00	na											0.0E+00	na	--
Monochlorobenzene	0			na	2.1E+04			na	2.1E+04											na	2.1E+04
Nickel	0	1.6E+02	1.7E+01	na	4.6E+03	1.6E+02	1.7E+01	na	4.7E+03									1.6E+02	1.7E+01	na	4.7E+03
Nitrate (as N)	0			na				na												na	--
Nitrobenzene	0			na	1.9E+03			na	1.9E+03											na	1.9E+03
N-Nitrosodimethylamine [C]	0			na	8.1E+01			na	8.7E+01											na	8.7E+01
N-Nitrosodiphenylamine [C]	0			na	1.6E+02			na	1.7E+02											na	1.7E+02
N-Nitrosodi-n-propylamine [C]	0			na	1.4E+01			na	1.5E+01											na	1.5E+01
Parathion	0	6.5E-02	1.3E-02	na		6.5E-02	1.3E-02	na										6.5E-02	1.3E-02	na	
PCB 1016	0		1.4E-02	na			1.4E-02	na											1.4E-02	na	--
PCB 1221	0		1.4E-02	na			1.4E-02	na											1.4E-02	na	--
PCB 1232	0		1.4E-02	na			1.4E-02	na											1.4E-02	na	--
PCB 1242	0		1.4E-02	na			1.4E-02	na											1.4E-02	na	--
PCB 1248	0		1.4E-02	na			1.4E-02	na											1.4E-02	na	--
PCB 1254	0		1.4E-02	na			1.4E-02	na											1.4E-02	na	--
PCB 1260	0		1.4E-02	na			1.4E-02	na											1.4E-02	na	--
PCB Total [C]	0			na	1.7E-03			na	1.8E-03											na	1.8E-03

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Pentachlorophenol [C]	0	7.7E-03	5.9E-03	na	8.2E+01	7.7E-03	5.9E-03	na	8.8E+01	--	--	--	--	--	--	--	--	**7.7E-03**	**5.9E-03**	na	**8.8E+01**
Phenol	0			na	4.6E+06			na	4.7E+06									--	--	na	**4.7E+06**
Pyrene	0			na	1.1E+04			na	1.1E+04									--	--	na	**1.1E+04**
Radionuclides (pCi/l except Beta/Photon)	0			na				na										--	--	na	--
Gross Alpha Activity	0			na	1.5E+01			na	1.5E+01									--	--	na	**1.5E+01**
Beta and Photon Activity (mrem/yr)	0			na	4.0E+00			na	4.1E+00									--	--	na	**4.1E+00**
Strontium 90	0			na	8.0E+00			na	8.1E+00									--	--	na	**8.1E+00**
Tritium	0			na	2.0E+04			na	2.0E+04									--	--	na	**2.0E+04**
Selenium	0	2.0E+01	5.0E+00	na	1.1E+04	2.0E+01	5.0E+00	na	1.1E+04									**2.0E+01**	**5.0E+00**	na	**1.1E+04**
Silver	0	2.5E+00		na	--	2.5E+00	--	na	--									**2.5E+00**	--	na	--
Sulfate	0			na				na										--	--	na	--
1,1,2,2-Tetrachloroethane [C]	0			na	1.1E+02			na	1.2E+02									--	--	na	**1.2E+02**
Tetrachloroethylene [C]	0			na	8.9E+01			na	9.6E+01									--	--	na	**9.6E+01**
Thallium	0			na	6.3E+00			na	6.4E+00									--	--	na	**6.4E+00**
Toluene	0			na	2.0E+05			na	2.0E+05									--	--	na	**2.0E+05**
Total dissolved solids	0			na	--			na										--	--	na	--
Toxaphene [C]	0	7.3E-01	2.0E-04	na	7.5E-03	7.3E-01	2.0E-04	na	8.1E-03									**7.3E-01**	**2.0E-04**	na	**8.1E-03**
Tributyltin	0	4.6E-01	6.3E-02	na		4.6E-01	6.3E-02	na	--									**4.6E-01**	**6.3E-02**	na	--
1,2,4-Trichlorobenzene	0			na	9.4E+02			na	9.6E+02									--	--	na	**9.6E+02**
1,1,2-Trichloroethane [C]	0			na	4.2E+02			na	4.5E+02									--	--	na	**4.5E+02**
Trichloroethylene [C]	0			na	8.1E+02			na	8.7E+02									--	--	na	**8.7E+02**
2,4,6-Trichlorophenol [C]	0			na	6.5E+01			na	7.0E+01									--	--	na	**7.0E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0			na	--			na	--									--	--	na	--
Vinyl Chloride [C]	0			na	6.1E+01			na	6.6E+01									--	--	na	**6.6E+01**
Zinc	0	1.0E+02	1.0E+02	na	6.9E+04	1.0E+02	1.0E+02	na	7.0E+04									**1.0E+02**	**1.0E+02**	na	**7.0E+04**

Notes

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline (0.25(WQC - background conc.) + background conc.) for acute and chronic
   (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens.
   Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Mixing ratios may be substituted for stream flows where appropriate

Metal	Target Value (SSTV)
Antimony	4.4E+03
Arsenic	9.0E+01
Barium	na
Cadmium	5.9E-01
Chromium III	3.8E+01
Chromium VI	6.4E+00
Copper	4.5E+00
Iron	na
Lead	6.4E+00
Manganese	na
Mercury	5.2E-02
Nickel	1.0E+01
Selenium	3.0E+00
Silver	1.0E+00
Zinc	4.0E+01

Note: do not use QL's lower than the maximum QL's provided in agency guidance

Louisa Regional Sewage Treatment Plant
VPDES Permit No. VA0067954 (proposed modification)
Louisa County Water Authority

Hardness Analysis Results

At several times over the last year (once in the spring and over a period of several weeks in the fall/winter) additional hardness samples were taken by plant staff at the Louisa Regional facility to determine the mean hardness level in the final effluent. The results of the 2006 testing are summarized below. As indicated, the average hardness was 83 mg/l. The effluent number used in the original draft permit was 39 mg/l. We ask that the effluent hardness value be changed to reflect the current data and the metals limits recalculated.

Sample Date	Hardness mg/l
14-Apr-06	57
12- Nov-06	43
14-Nov-06	35
16-Nov-06	238
19-Nov-06	169
21-Nov-06	55
23-Nov-06	46
25-Nov-06	40
10-Dec-06	63
Average	**83**

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7.6 90th percentile pH

Mixing Zone Predictions for Louisa Regional

Effluent Flow = 0.8 MGD
Stream 7Q10 = .003 MGD
Stream 30Q10 = .078 MGD
Stream 1Q10 = .003 MGD
Stream slope = .001 ft/ft
Stream width = 12 ft
Bottom scale = 2
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = .3608 ft
Length = 425.3 ft
Velocity = .2871 ft/sec
Residence Time = .0171 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = .381 ft
Length = 405.61 ft
Velocity = .2972 ft/sec
Residence Time = .0158 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = .3608 ft
Length = 425.3 ft
Velocity = .2871 ft/sec
Residence Time = .4115 hours

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.

7/24/2009 8:16:39 AM

Facility = Louisa Regional WWTP
Chemical = Copper
Chronic averaging period = 4
WLAa = 181.35
WLAc = 120.9
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 10
Expected Value = 12.9658
Variance = 24.9254
C.V. = 0.385053
97th percentile daily values = 24.3514
97th percentile 4 day average = 18.2282
97th percentile 30 day average= 14.6803
< Q.L. = 0
Model used = lognormal

No Limit is required for this material

The data are:

11
29
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Attachment 4

4/11/2007 11:27:21 AM

Facility = Louisa Regional 0.4
Chemical = Zinc
Chronic averaging period = 4
WLAa = 100
WLAc = 100
Q.L. = 20
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 22
Expected Value = 119.170
Variance = 3462.92
C.V. = 0.493801
97th percentile daily values = 254.067
97th percentile 4 day average = 182.825
97th percentile 30 day average= 139.380
< Q.L. = 1
Model used = delta lognormal

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 100
Average Weekly limit = 100
Average Monthly LImit = 100

The data are:

170
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4/11/2007 11:27:38 AM

Facility = Louisa Regional 0.8
Chemical = Zinc
Chronic averaging period = 4
WLAa = 100
WLAc = 100
Q.L. = 20
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 22
Expected Value = 119.170
Variance = 3462.92
C.V. = 0.493801
97th percentile daily values = 254.067
97th percentile 4 day average = 182.825
97th percentile 30 day average= 139.380
< Q.L. = 1
Model used = delta lognormal

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 100
Average Weekly limit = 100
Average Monthly LImit = 100

The data are:

170
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12/31/03 6:37:56 AM

Facility = Louisa Regional STP
Chemical = Ammonia as Nitrogen (Winter)
Chronic averaging period = 30
WLAa = 18.86
WLAc = 4.39
Q.L. = .2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 8.8575717100976
Average Weekly limit = 6.4788150239553
Average Monthly LImit = 4.82587038174656

The data are:

9

12/31/03 6:37:20 AM

Facility = Louisa Regional STP
Chemical = Ammonia as Nitrogen (Summer)
Chronic averaging period = 30
WLAa = 17.16
WLAc = 2.04
Q.L. = .2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 4.11604699056927
Average Weekly limit = 3.01065663983344
Average Monthly LImit = 2.24254568992323

The data are:

9

4/12/2007 9:49:15 AM

Facility = Louisa Regional 0.8
Chemical = Ammonia as N (Nov-Apr)
Chronic averaging period = 30
WLAa = 61
WLAc = 7.8
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 15.7378267286472
Average Weekly limit = 11.5113342111279
Average Monthly LImit = 8.57443940264764

The data are:

9

4/12/2007 9:49:44 AM

Facility = Louisa Regional 0.8
Chemical = Ammonia as N (May-Oct)
Chronic averaging period = 30
WLAa = 59
WLAc = 4.6
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 9.28128242971503
Average Weekly limit = 6.78873556040874
Average Monthly LImit = 5.0567206733563

The data are:

9

Citizens may comment on the proposed reissuance of a permit that allows the release of treated wastewater into a water body in Louisa County, Virginia and to seek comment on a proposed Water Effect Ratio (WER) study for that same water body.

PUBLIC COMMENT PERIOD: [Date], 2009 to 5:00 p.m. on [Date], 2009

PERMIT NAME: Virginia Pollutant Discharge Elimination System Permit – Wastewater
Owners or operators of municipal facilities that discharge or propose to discharge wastewater into the streams, rivers or bays of Virginia from a point source must apply for this permit. In general, point sources are fixed sources of pollution such as pipes, ditches or channels. The applicant must submit the application to the Department of Environmental Quality, under the authority of the State Water Control Board.

PURPOSE OF NOTICE: To invite the public to comment on the draft permit.

NAME AND ADDRESS OF APPLICANT: Louisa County Water Authority
P.O. Box 9, Louisa, VA 23093

NAME, ADDRESS, AND PERMIT NUMBER OF FACILITY: Louisa Regional WWTP (VA0067954)
131 Pine Ridge Drive, Louisa, VA

PROJECT DESCRIPTION: The Louisa County Water Authority has applied for a reissuance of a permit for the Louisa Regional WWTP in Louisa County, Virginia. The applicant proposes to release treated sewage at a rate of up to 0.8 MGD into Beaver Creek in Louisa County that is in the York River watershed. A watershed is the land area drained by a river and its incoming streams. The sludge will be disposed of through land application on 48 acres of land owned by Mack Houston and land owned by Charles Winston. The permit will limit the following pollutants to amounts that protect water quality: Flow, pH, Dissolved Oxygen, Total Suspended Solids, Carbonaceous Biochemical Oxygen Demand, Total Recoverable Zinc, Ammonia as Nitrogen, and *E. coli*. The permit will contain monitoring and annual concentration limits for Total Nitrogen and Total Phosphorus. This facility is subject to the requirements of 9 VAC 25-820 and has registered for coverage under the General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Watershed in Virginia.

WATER EFFECT RATIO STUDY: The Louisa County Water Authority conducted a study to develop a site-specific WER for the purpose of applying the copper water quality criteria, as defined in 9 VAC25-260-140(B). The study concluded that the final WER for copper at the specified location is 15.70, which result in acute and chronic copper criteria of 181.35 ug/L and 120.9 ug/L respectively, for the Louisa Regional WWTP VPDES permit.

HOW A DECISION IS MADE: After public comments have been considered and addressed by the permit or other means, DEQ will make the final decision unless there is a public hearing. DEQ may hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the proposed permit. If there is a public hearing, the State Water Control Board will make the final decision.

HOW TO COMMENT: DEQ accepts comments by e-mail, fax or postal mail. All comments must be in writing and be received by DEQ during the comment period. The public also may request a public hearing.

WRITTEN COMMENTS MUST INCLUDE:
1. The names, mailing addresses and telephone numbers of the person commenting and of all people represented by the citizen.
2. If a public hearing is requested, the reason for holding a hearing, including associated concerns.
3. A brief, informal statement regarding the extent of the interest of the person commenting, including how the operation of the facility or activity affects the citizen.

TO REVIEW THE DRAFT PERMIT AND APPLICATION: The public may review the documents at the DEQ-Northern Regional Office every work day by appointment.

CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS AND ADDITIONAL INFORMATION:
Name: Alison Thompson
Address: DEQ-Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193
Phone: (703) 583-3834 E-mail: alison.thompson@deq.virginia.gov Fax: (703) 583-3821

Attachment 5

Revised 2/2003

State "Transmittal Checklist" to Assist in Targeting
Municipal and Industrial Individual NPDES Draft Permits for Review

Part I. State Draft Permit Submission Checklist

In accordance with the MOA established between the Commonwealth of Virginia and the United States Environmental Protection Agency, Region III, the Commonwealth submits the following draft National Pollutant Discharge Elimination System (NPDES) permit for Agency review and concurrence.

Facility Name: Louisa Regional WWTP
NPDES Permit Number: VA0067954
Permit Writer Name: Alison L. Thompson
Date: 7/30/09

Major [ ] **Minor** [X] **Industrial** [ ] **Municipal** [X]

I.A. Draft Permit Package Submittal Includes:	**Yes**	**No**	**N/A**
1. Permit Application?	X		
2. Complete Draft Permit (for renewal or first time permit – entire permit, including boilerplate information)?	X		
3. Copy of Public Notice?	X		
4. Complete Fact Sheet?	X		
5. A Priority Pollutant Screening to determine parameters of concern?	X		
6. A Reasonable Potential analysis showing calculated WQBELs?	X		
7. Dissolved Oxygen calculations?	X		
8. Whole Effluent Toxicity Test summary and analysis?			X
9. Permit Rating Sheet for new or modified industrial facilities?			

I.B. Permit/Facility Characteristics	**Yes**	**No**	**N/A**
1. Is this a new, or currently unpermitted facility?		X	
2. Are all permissible outfalls (including combined sewer overflow points, non-process water and storm water) from the facility properly identified and authorized in the permit?	X		
3. Does the fact sheet **or** permit contain a description of the wastewater treatment process?	X		
4. Does the review of PCS/DMR data for at least the last 3 years indicate significant non-compliance with the existing permit? Problems with Zinc	X		
5. Has there been any change in streamflow characteristics since the last permit was developed?		X	
6. Does the permit allow the discharge of new or increased loadings of any pollutants?	X		
7. Does the fact sheet **or** permit provide a description of the receiving water body(s) to which the facility discharges, including information on low/critical flow conditions and designated/existing uses?	X		
8. Does the facility discharge to a 303(d) listed water? Impairment downstream		X	
a. Has a TMDL been developed and approved by EPA for the impaired water?	X		
b. Does the record indicate that the TMDL development is on the State priority list and will most likely be developed within the life of the permit? Already approved			X
c. Does the facility discharge a pollutant of concern identified in the TMDL or 303(d) listed water?	X		
9. Have any limits been removed, or are any limits less stringent, than those in the current permit?	X		
10. Does the permit authorize discharges of storm water?		X	

Attachment 6

I.B. Permit/Facility Characteristics – cont.	Yes	No	N/A
11. Has the facility substantially enlarged or altered its operation or substantially increased its flow or production?		X	
12. Are there any production-based, technology-based effluent limits in the permit?		X	
13. Do any water quality-based effluent limit calculations differ from the State's standard policies or procedures? WER approved by EPA Standards 7/21/09	X		
14. Are any WQBELs based on an interpretation of narrative criteria?		X	
15. Does the permit incorporate any variances or other exceptions to the State's standards or regulations? WER approved by EPA Standards 7/21/09	X		
16. Does the permit contain a compliance schedule for any limit or condition?		X	
17. Is there a potential impact to endangered/threatened species or their habitat by the facility's discharge(s)?		X	
18. Have impacts from the discharge(s) at downstream potable water supplies been evaluated?	X		
19. Is there any indication that there is significant public interest in the permit action proposed for this facility?		X	
20. Have previous permit, application, and fact sheet been examined?	X		

Part II. NPDES Draft Permit Checklist

Region III NPDES Permit Quality Checklist – for POTWs

(To be completed and included in the record only for POTWs)

II.A. Permit Cover Page/Administration	Yes	No	N/A
1. Does the fact sheet or permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)?	X		
2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)?	X		

II.B. Effluent Limits – General Elements	Yes	No	N/A
1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)?	X		
2. Does the fact sheet discuss whether "antibacksliding" provisions were met for any limits that are less stringent than those in the previous NPDES permit?	X		

II.C. Technology-Based Effluent Limits (POTWs)	Yes	No	N/A
1. Does the permit contain numeric limits for ALL of the following: BOD (or alternative, e.g., CBOD, COD, TOC), TSS, and pH?	X		
2. Does the permit require at least 85% removal for BOD (or BOD alternative) and TSS (or 65% for equivalent to secondary) consistent with 40 CFR Part 133?	X		
a. If no, does the record indicate that application of WQBELs, or some other means, results in more stringent requirements than 85% removal or that an exception consistent with 40 CFR 133.103 has been approved?	X		
3. Are technology-based permit limits expressed in the appropriate units of measure (e.g., concentration, mass, SU)?	X		
4. Are permit limits for BOD and TSS expressed in terms of both long term (e.g., average monthly) and short term (e.g., average weekly) limits?	X		
5. Are any concentration limitations in the permit less stringent than the secondary treatment requirements (30 mg/l BOD5 and TSS for a 30-day average and 45 mg/l BOD5 and TSS for a 7-day average)?		X	
a. If yes, does the record provide a justification (e.g., waste stabilization pond, trickling filter, etc.) for the alternate limitations?			X

II.D. Water Quality-Based Effluent Limits	Yes	No	N/A
1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality?	X		
2. Does the fact sheet indicate that any WQBELs were derived from a completed and EPA approved TMDL?		X	
3. Does the fact sheet provide effluent characteristics for each outfall?	X		
4. Does the fact sheet document that a "reasonable potential" evaluation was performed?	X		
a. If yes, does the fact sheet indicate that the "reasonable potential" evaluation was performed in accordance with the State's approved procedures?	X		
b. Does the fact sheet describe the basis for allowing or disallowing in-stream dilution or a mixing zone?	X		
c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have "reasonable potential"?	X		
d. Does the fact sheet indicate that the "reasonable potential" and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations)?	X		
e. Does the permit contain numeric effluent limits for all pollutants for which "reasonable potential" was determined?	X		

II.D. Water Quality-Based Effluent Limits – cont.	Yes	No	N/A
5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet?	X		
6. For all final WQBELs, are BOTH long-term AND short-term effluent limits established?	X		
7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)?	X		
8. Does the record indicate that an "antidegradation" review was performed in accordance with the State's approved antidegradation policy?	X		

II.E. Monitoring and Reporting Requirements	Yes	No	N/A
1. Does the permit require at least annual monitoring for all limited parameters and other monitoring as required by State and Federal regulations?	X		
a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver?			
2. Does the permit identify the physical location where monitoring is to be performed for each outfall?	X		
3. Does the permit require at least annual influent monitoring for BOD (or BOD alternative) and TSS to assess compliance with applicable percent removal requirements?		X	
4. Does the permit require testing for Whole Effluent Toxicity?	X		

II.F. Special Conditions	Yes	No	N/A
1. Does the permit include appropriate biosolids use/disposal requirements?	X		
2. Does the permit include appropriate storm water program requirements?			X

II.F. Special Conditions – cont.	Yes	No	N/A
3. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements?			X
4. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations?	X		
5. Does the permit allow/authorize discharge of sanitary sewage from points other than the POTW outfall(s) or CSO outfalls [i.e., Sanitary Sewer Overflows (SSOs) or treatment plant bypasses]?		X	
6. Does the permit authorize discharges from Combined Sewer Overflows (CSOs)?		X	
a. Does the permit require implementation of the "Nine Minimum Controls"?			X
b. Does the permit require development and implementation of a "Long Term Control Plan"?			X
c. Does the permit require monitoring and reporting for CSO events?			X
7. Does the permit include appropriate Pretreatment Program requirements?	X		

II.G. Standard Conditions	Yes	No	N/A
1. Does the **permit** contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions?	X		

List of Standard Conditions – 40 CFR 122.41

Duty to comply
Duty to reapply
Need to halt or reduce activity not a defense
Duty to mitigate
Proper O & M
Permit actions
Property rights
Duty to provide information
Inspections and entry
Monitoring and records
Signatory requirement
Bypass
Upset
Reporting Requirements
Planned change
Anticipated noncompliance
Transfers
Monitoring reports
Compliance schedules
24-Hour reporting
Other non-compliance

2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for POTWs regarding notification of new introduction of pollutants and new industrial users [40 CFR 122.42(b)]?	X		

Part III. Signature Page

Based on a review of the data and other information submitted by the permit applicant, and the draft permit and other administrative records generated by the Department/Division and/or made available to the Department/Division, the information provided on this checklist is accurate and complete, to the best of my knowledge.

Name	Alison L. Thompson
Title	Environmental Specialist II
Signature	
Date	7/30/09

BASIS FOR CONVENTIONAL POLLUTANT EFFLUENT LIMITS - 0.40 MGD FACILITY

These limits (10 mg/l $CBOD_5$, 30 mg/l TSS, 6.0 mg/l D.O.) were established based on the site inspection report dated July 21, 1994 and a memo entitled "Dry Ditch Discharges and Other Waters Not Easily Modeled" (2/17/95) from Larry Lawson, P.E. and Alan Anthony, Ph.D. to Frank Daniel. Attached to the memo is another memo entitled "Permit Limits for Waters not Easily Modelable" (1/20/95) which describes the effluent limits required for swamps or marshes. The site inspection report dated 07/24/94 from Lisa Buffin, verified the "swamp-like" nature of Beaver Creek about a quarter to one-half mile downstream of the discharge due to obstructions caused by beaver activity. The 1/20/95 memo did not indicate a required TSS limit so the federal effluent requirement of 30 mg/l will still apply.

Ammonia limits are calculated based on a 100% complete mix assumption (see attached correspondence between Lisa Buffin and Dale Phillips). Beaver Creek is not "swamp like" at the point of discharge and thus a "mixing zone" was allowed for Ammonia. The Ammonia limits for the 0.4 MGD facility are further detailed in Attachment E of this Statement of Basis. A new evaluation of data indicates that ammonia limitations could be increased; however, since TKN must be controlled at 3.0 mg/l or less, backsliding prevents this from being implemented. The monthly maximum limitation has changed to weekly average; however, this represents the same statistical evaluation of information. The permittee has been meeting existing ammonia limitations.

Antidegradation Status: The receiving stream in the vicinity of the subject discharge has been evaluated in accordance with OWRM Guidance Memo No. 93-015. This permit action does not involve a new discharge or an increase in flow from an existing discharge. Consequently, non further evaluation is necessary.

Attachment 7

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY

Valley Regional Office

116 North Main Street P. O. Box 268 Bridgewater, VA 22812

SUBJECT: Inspection of Beaver Creek
Louisa Regional STP Discharge
VPDES Permit No. VA0067954 - Louisa County

TO: VRO File

FROM: Lisa Buffin - VRO, DEQ LB

DATE: 07/21/94

COPIES: B. K. Fowler, L. M. Simmons

On July 8, 1994, Keith Fowler and I inspected Beaver Creek to ascertain the need for stream monitoring as required by the current Louisa Regional STP permit. The permit requires that a plan be developed to identify the parameters and monitoring locations necessary to verify that the oxygen demanding pollutants being discharged by Louisa Regional STP are not impacting Beaver Creek. Mr. H. Barlow Delk, the General Manager of the Louisa County Water Authority, disputed the need for stream monitoring because of the alleged naturally low dissolved oxygen (D.O.) in the creek. Mr. Delk and Mr. David Jones (operator) were present at the inspection.

Beaver Creek has a 7Q10 flow of 0.008 MGD. Tanyard Creek flows through a section of golf course and then enters Beaver Creek just below the discharge. Icepond Creek subsequently enters Beaver Creek on the opposite side. Filamentous algae were present in both Beaver Creek just downstream of this junction and Tanyard Creek upstream. After its confluence with Tanyard Creek and Icepond Creek, Beaver Creek flows through a very small section of golf course and then enters a wooded area where beaver activity is evident. Although Beaver Creek is a defined channel, the site inspection confirmed that it is not modelable since there are significant flow obstructions due to the beaver activity. Historical data also exist regarding the presence of beaver dams and other obstructions (DSWI memo dated 12/16/82).

Although the 1984 permit had a stream monitoring requirement, it was never implemented due to STP performance problems (fact sheet, 1989 permit). Monitoring data were first submitted in June of 1989. The data from June 1989 to November 1989 indicate a lower average D.O. concentration upstream than downstream. Two upstream D.O. concentrations (3.9 mg/L daily average, 3.8 mg/L minimum) and none of the downstream concentrations violated the Water Quality

Standards (WQS) during this period. (WQS = 5.0 mg/L daily average, 4.0 mg/L minimum). These data are summarized on the attached page. The 03/29/89 permit required only downstream D.O. monitoring between April and October. Thus, no upstream data are available for comparison after November 1989. Downstream data indicate several D.O. violations. These data (04/05/90-05/30/94) are summarized as follows:

Violations of WQS Minimum Concentration

07/22/91	10:45 am	3.8 mg/L
09/16/91	11:00 am	3.0 mg/L
10/28/91	11:15 am	3.4 mg/L
10/25/93	11:00 am	3.3 mg/L

Violations of WQS Daily Average Concentration

07/15/91	11:45 am	4.2 mg/L
	4:15 pm	4.2 mg/L
	Average	4.2 mg/L
09/16/91	11:00 am	3.0 mg/L
	3:45 pm	5.6 mg/L
	Average	4.3 mg/L
10/28/91	11:15 am	3.4 mg/L
	3:35 pm	4.5 mg/L
	Average	4.0 mg/L
10/25/93	11:00 am	3.3 mg/L
	4:15 pm	5.6 mg/L
	Average	4.4 mg/L

The site inspection supported the conclusion stated in the 1993 fact sheet that the STP does not appear to be exacerbating the occasional downstream D.O. violations. The low D.O.s and the D.O. fluctuations could result from the beaver impoundments and naturally low velocity conditions; algal activity; and organic and nutrient inputs from leaves and runoff, as well as the STP discharge. The STP is possibly contributing a higher BOD load than any other source, although the average effluent cBOD concentration from January 1990 through June 1994 is 4.7 mg/L (range = 2.1 mg/L - 10 mg/L). There were no effluent D.O. violations (permit limit = 6.0 mg/L) during this period. The high quality of the effluent data and the proximity of the downstream monitoring station provide very strong indications that the problem is not the BOD and D.O. concentrations of the effluent. Other D.O. demands on the stream

could include resident algae (there possibly from nutrient enriched conditions) and settled organic matter.

From the inspection and the data available, the actual source of the low D.O. concentrations has yet to be determined. It is recommended that the STP conduct downstream monitoring of Beaver Creek with control stations upstream in Beaver Creek, Tanyard Creek and Icepond Creek in order to exclude itself as the possible source.

Plans for STP expansion are underway. Based on the current quality of the receiving stream and the unmodelable condition downstream, we plan to assign "swamp limits" (10 mg/L cBOD, 10 mg/L TSS, 3 mg/L TKN) to any proposed expansion unless an approvable model is submitted by the permittee to indicate that alternative limits would protect downstream water quality.

Average Daily Concentrations of Temperature and Dissolved Oxygen
BEAVER CREEK - Upstream and Downstream of Discharge Point

	UPSTREAM		DOWNSTREAM	
DATE	T (degC)	DO (mg/L)	T (degC)	DO (mg/L)
6/17/89	20	7.3	17.5	7.9
6/24/89	22	7.2	22	7.4
7/1/89	20.3	7.6	21.5	7.2
7/8/89	24.5	7.3	23.5	7
7/14/89	25	6.1	23.5	6.9
7/21/89	24	6.5	24	6.9
7/28/89	27.5	6.1	25	6.7
8/4/89	26.5	8.1	25	6.8
8/10/89	19	6.9	20.5	7.2
8/18/89	20.5	6.6	20.5	6.8
8/24/89	25	3.9	24.5	7.1
9/1/89	20.5	5.4	23	7.2
9/7/89	20.5	7.2	22	7.3
9/14/89	23	5.1	23	7.1
9/28/89	21.5	5.8	22	7
10/5/89	18.5	6.7	18.5	6.8
10/13/89	16	7.7	18	7.6
10/26/89	15	9	15.5	8.9
11/10/89	15	9.5	15.5	9.5
11/17/89	14	9.1	14	9
11/24/89	14	9.3	14.5	9

LL

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY

116 North Main Street P. O. Box 268 Bridgewater, VA 228

SUBJECT: MIX.EXE Program - Louisa Regional STP Permit Modification
VPDES Permit No. VA0067954

TO: Dale Phillips

FROM: Lisa Buffin LB

DATE: 05/19/95

COPIES: File

Per my telephone call to you today, here are the specifications whic
were entered into the MIX.EXE program for the above referenced
facility:

Name of Discharger:	Louisa Regional STP
7Q10 stream flow:	0.0078 MGD
1Q10 stream flow:	0.0065 MGD
Effluent flow:	0.20 MGD (existing)
	0.40 MGD (proposed)
Stream slope:	0.005 ft/ft
Stream width:	1 foot
Stream roughness:	2
Meandering:	1 (until confluence w/Tanyard Branch)

I have attached the MIX.EXE result. These estimated values are only applicable to Beaver Creek at the point of discharge. I inspected th stream in July of 1994. Please note that two other streams (Tanyard Branch and Icepond) enter immediately below the point of discharge. The stream then becomes unmodelable/swamplike downstream due to beave activity.

I have encountered this problem before with a similar stream (one wit very low 7Q10 flow). Could you please explain what is occurring?

It appears that the flow from this facility entering such a small stream would result in a 100% complete mix. Please review this information and provide me with your comments (by FAX if possible) at your earliest convenience so that I may continue permit processing. Thanks.

The specifications you have entered leads to a stream that is too narrow and deep for this program to estimate mixing, e.g. The width is less than 10 times the depth

Check your input data and if it is correct, contact Dale Phillips in OWRM (527-5076) for assistance

C:\MENU\MIX>

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
Water Division
4900 Cox Road P.O.Box 10009 Glen Allen, Virginia 23240

MEMORANDUM

Subject: Louisa Mixing

To: Lisa Buffin

From: M. Dale Phillips Dale

Date: May 22, 1995

Copies:

There is no problem with your analysis. I am familiar with the stream in question and your inputs are O.K. The results you experienced are due to the assumptions made during development of the program. It was assumed that streams would be wide relative to their depth and the program uses a ratio of 10:1 to check this assumption. In this case, the program, appropriately, found that the width is less than 10 times the depth and did not run, I agree that this accurate for this stream. I do not have a model that will provide a reasonable prediction for this extremely small stream.

Regarding this particular situation, mixing assumptions should not make a significant difference because the stream flow is so low compared to the effluent that the effluent will have to meet or be extremely close to the applicable standards at the pipe end.

Based on my personal knowledge of the stream and the discharge in question, I would recommend that you apply a complete mix assumption to evaluate this discharge.

Relative to your general question about small streams, recall that this model neglects initial mixing. This means that no hydraulic distinction is made between the two streams and mixing is due entirely to ambient turbulence. The result of this treatment is that it will require the same distance for a small stream to mix with a large effluent as required for a small effluent to mix with a large stream.

This may lead to relatively large errors in estimating mixing distances where the stream's flow is very, very small. However, the error will probably not be any larger than estimates of velocity and flow in these streams.

In general, the WLA should not be significantly wrong due to these errors because of the general unimportance of mixing in these very small streams. If the impact does become significant, then it is often easy to sufficiently demonstrate the actual mixing in these streams with a few milliliters of dye and visual observation.